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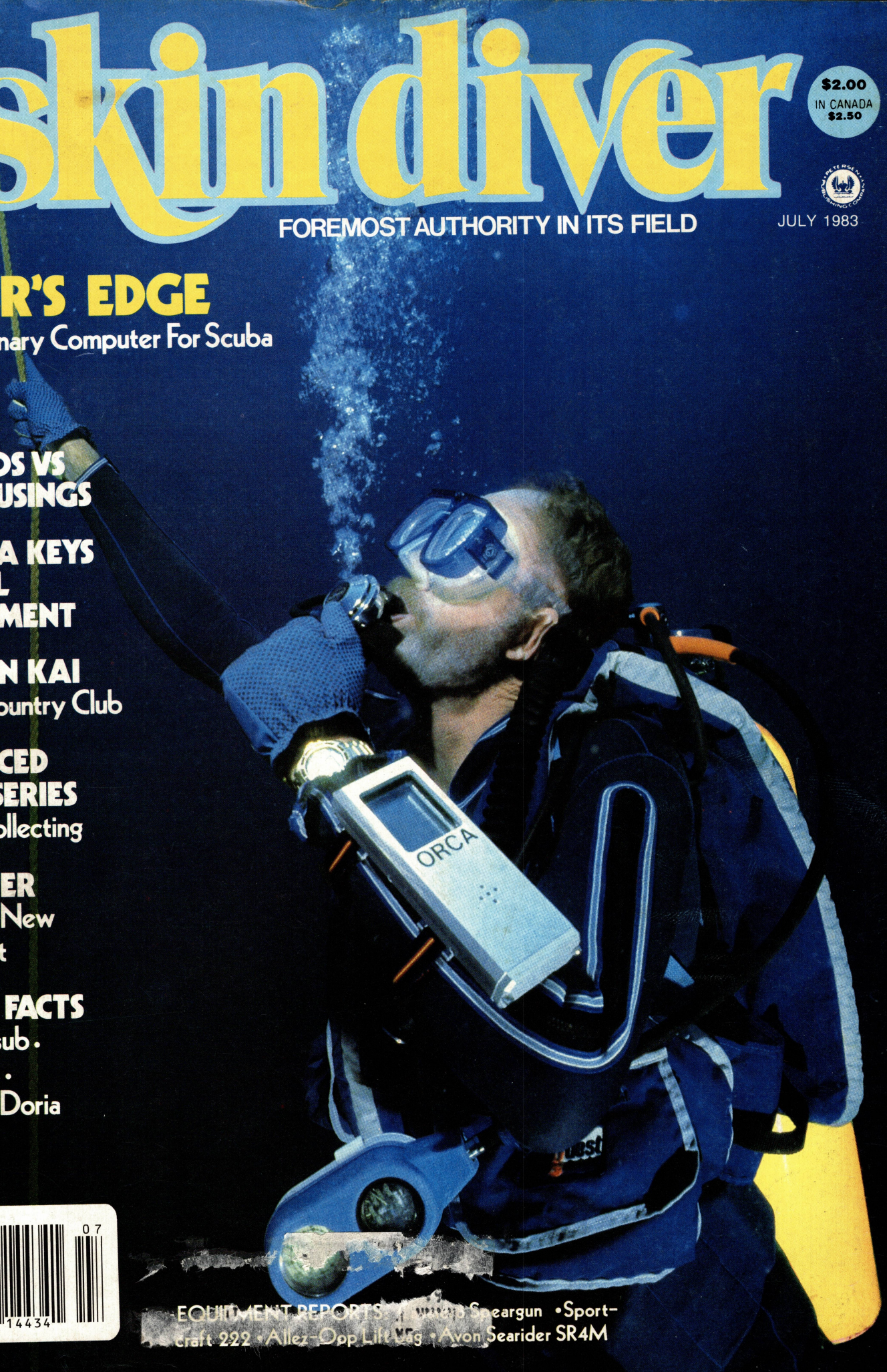
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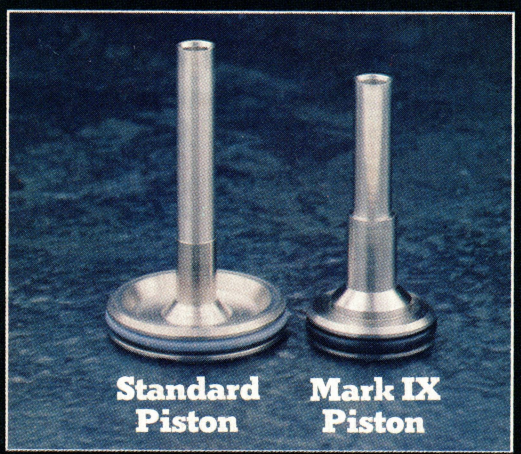
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Introducing Scubapro Mark IX

Smaller is Bigger
Scubapro's Mark IX is a smaller, lighter, improved version of the famous, often copied Scubapro Mark VIII. Because of its smaller size, fewer parts, and newer design features, the Mark IX is destined to lead innumerable divers to the fact that smaller is bigger in scuba.

Higher Performance Under 1000 PSI
Many regulators perform well at high tank pressures but not at low tank pressures. The Mark IX performs equally well at both high and low pressures providing substantially more air flow than other regulators at or below 1000 PSI.

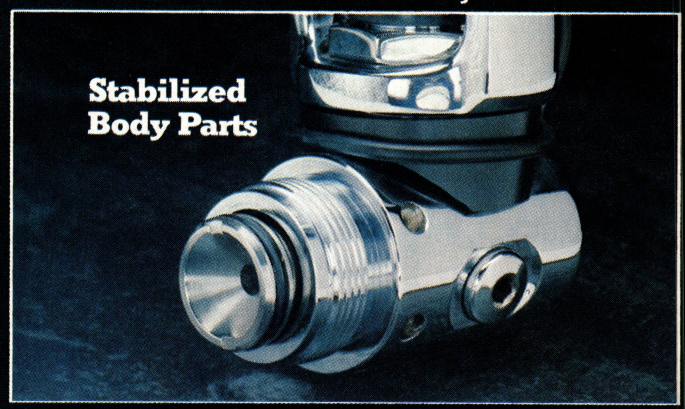


The smaller, lighter weight Mark IX piston generates a greater amount of air flow with less friction and resistance. As a result, less effort is needed to balance air flow when tank and depth pressures change.



The Mark IX's new, conical shaped filter has 300% more filtering capability than conventional flat filters. The new conical filter functions especially well at low tank pressures.

Stabilized Body Parts
Unlike any other regulator, the Mark IX houses all its moving parts within the body making for a stronger, more precision valve. Because of the one piece construction of the body, the moving parts are held firmly in alignment reducing friction and inefficiency. The result being a longer life and increased reliability.





Seven Ports
The Mark IX regulator has 5 low pressure and 2 high pressure ports. the 5 low pressure ports are positioned for any hose orientation to suit personalized gear arrangement.

New Super Flow Hose
The Mark IX's increased efficiency is also the result of the new and exclusive **Scubapro Super Flow Hose** that allows 33% more air flow at lower tank pressures over conventional hoses. (The Scubapro Super Flow Hose is now interchangeable with all standard low pressure hoses and is now used on all Scubapro regualtors.)

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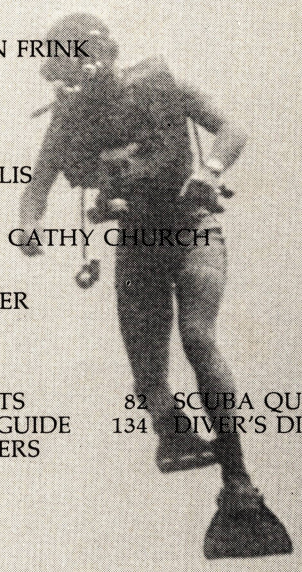
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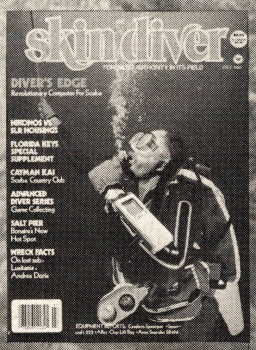
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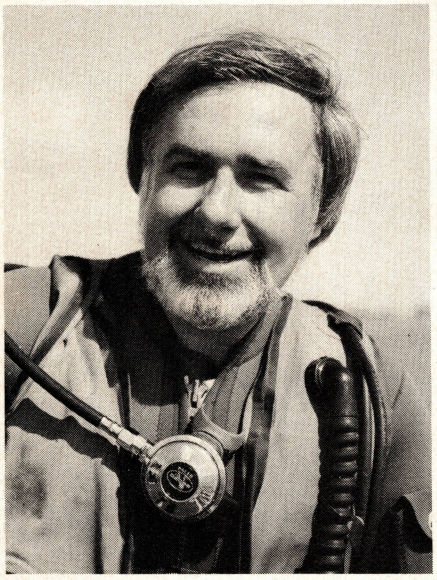
COVER

Geri Murphy photographed Dr. Bruce Bassett, in the clear waters off the island of Bonaire, as he tested the new, computerized Diver's E.D.G.E. For more information on this instrument see page 84.

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SDM Editorial

BY THE PUBLISHER



OCEAN CERTIFICATION: C-CARD OF THE FUTURE?

January of this year we discussed the growing credibility gap of the C-card. Many thousands of divers are turning up at tropical dive resorts and dive boats with a C-card in hand but lacking the ability to dive safely. Subsequent editorials were devoted to various aspects of this problem and how they contribute to the overall situation. Last month we discussed the growing gap in what is being taught in U.S. based scuba classes and what graduate students actually encounter in tropical diving. Students are being prepared to dive in one area and end up on the doorsteps of island resorts, attempting to utilize their newly learned skills in an entirely different environment. This is probably a major contributing cause to the C-card credibility gap as far as new divers are concerned. To make matters worse, these new divers are misinformed: They actually think they are ready for tropical diving, even though they haven't a clue about the differences between these and their local waters.

In all fairness to the training associations, we must recognize the progress which has been made in scuba training over the last 30 years. This sport has come a long way in the development of conscientious, safety oriented scuba training programs.

I can still recall the day I purchased my first scuba rig in 1955. In those days, there were no scuba classes, no certification. The guy who sold me the rig gave me a 15 minute dissertation on how it worked and suggested that I seek out a gas supply company to fill the tank. I made my first dive in a lake, completely alone. I suspect the only reason I survived was my three years' prior experience of free diving with mask and fins.

In the 1960s we witnessed the beginning of formalized scuba courses and the formation of national associations such as YMCA, NAUI, etc. The C-card was officially established by the training associations and embraced by the entire dive industry. In the 1970s, we saw a gradual shift toward open water training. Scuba instructors began moving their classes out of the swimming pools for a single open water check-out, then two, and now three to five open water training exercises. A newly designed C-card identifies open water as part of the overall training.

All of these events were major milestones in the evolution of our sport. Scuba training has been changing constantly, improving and adapting to the needs of the students. The sport has not only grown and prospered, it has also become safer. We now have fewer accidents for a greater number of participating divers.

Perhaps the time is right for still another milestone in scuba training. Maybe the time has come to once again adapt to the changing trends among today's divers. The 1980s have become an era for dive travel. We have had an explosive growth in this area of the sport, evidenced by the hundreds of dive resort operations which have been popping up like mushrooms throughout Florida, the Caribbean islands, Mexico and the Pacific. An estimated one-half million divers now participate in dive travel vacations.

SKIN DIVER's 1983 survey of its readers indicates 49 percent of today's active divers are traveling outside the Continental U.S. The purposes of these trips include one to two week dive vacations, weekender trips, business trips and offshore conferences. The same survey indicates 72 percent of today's divers are involved in interstate dive travel. The majority of these divers are traveling from their home states to coastal regions such as Florida, California, New England and the mid-Atlantic states. America is on the move. Inland divers are migrating to the oceans like newly hatched turtles seeking their mother sea. And as with the baby turtles, these new divers are vulnerable to the hazards of the open ocean.

With so many of today's divers engaged in dive travel, you would think that scuba courses would provide lectures and training about the ocean environment. Some of them do, but far more do not. Inland scuba courses are still being taught in the traditional manner, preparing the student for the local environment. Students are given their open water training exercises in a quarry, pond, lake, river or other open water bodies. This is a natural and logical progression in training since the majority of the students will go on to make their first dives locally.

The big question is, "Does this local training properly prepare the student for the ocean environment?" Not hardly. There is no way that a quarry dive can simulate the problems related to tidal currents, surface chop, ground swells, surge or surf. Few of these classes ever touch upon the hazard of razor sharp coral, sea urchins, stinging hydroids, fire coral, bristleworms or "dread red" sponge. And, little is said about dive boat etiquette, scuba gear management aboard a boat or dive ramp safety. Unfortunately, students graduating from local training courses are often unaware of how much they don't know about ocean diving. They are awarded an open water C-card and feel confident they can dive anywhere. It is this ignorance and lack of ocean training which is the crux of the C-card credibility gap at the resort level.

Why not fill this gap by creating a new type of certification card—Ocean Certification? Such a card could accomplish several things simultaneously. First, it would clearly distinguish between open water certification and actual ocean training. Second, it would provide a new rung in the ladder of scuba certification: It would create a place in the system for ocean training and probably evolve into a separate training course. Third, it would provide resort operators and boat skippers with a simple and easy method of distinguishing between customers with ocean training and those without. The ocean certification card is the missing link which could build a bridge between local diving and the tropical resort experience.



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BY ELLSWORTH BOYD

Darrell Mark Tepoorten, Los Angeles, is very excited and I can't say I blame him. He has discovered a World War II Japanese submarine, approximately 300 feet long, upright in only 60 feet of water.

Mark writes: "The sub is intact with no traces of bombing or artillery damage. It is in a remote area of the Pacific, nowhere near Micronesia or anyplace where it is illegal to salvage such a prize. Jim Ashenbrenner, one of my partners, will assist in an attempted salvage operation. Jim owns Scuba Duba Dive Supply in Reseda, California, and is an expert at salvage. He was a technical advisor for the motion picture, *Raise the Titanic*.

Mark has planned several phases for his operation, including a return trip to the wreck for still and motion pictures, the eventual salvage operation and finally the return of the submarine to Los Angeles for display. Divers interested in participating in the salvage operation may contact Mark at: 909 S. Bonnie Brae, Apartment 207, Los Angeles, California 90006; (213) 464-0676.

Mike Garrigan, stationed in the Marshall Islands, says that he belongs to the Roi-Namur Dolphins Scuba Club, located on Roi-Namur, Kwajalein Atoll, in the Marshalls. Mike and his buddies are diving a German wreck, the *Prinz Eugen*, two Japanese tankers, and several aircraft wrecks. He wants to trace the wrecks and has asked for addresses of United States and Japanese naval archives offices that might help him.

First of all, Mike, I would obtain a copy of *WW II Wrecks of the Kwajalein and Truk Lagoons* by Dan E. Bailey. It was published by North Valley Diver Publications, Suite #166, P.O. Box 6007, Redding, CA 96099. It sells for $15.95. You might also write to: Office of Information, Department of the Navy, Washington, D.C. 20350. Then try two more U.S. Navy addresses: Press Chief of Public Affairs, Headquarters—Fourteenth Naval District, Box 110, FPO San Francisco, CA 96610; Head Curator, U.S. Naval Memorial Museum, Ninth and M Sts., S.E., Washington, D.C. 20390. In Japan, try the Maritime Staff Office, 1-3 Chome Kasumi-

(Continued on Page 48)

ASSOCIATE OF APPLIED SCIENCE DEGREE NOW OFFERED FOR NEW, INTENSIVE TRAINING PROGRAM AT COMMERCIAL DIVING CENTER, LOS ANGELES.

COMMERCIAL DIVING CENTER OF LOS ANGELES announces the recent accreditation of their diver training program. The Center now offers an ASSOCIATE OF APPLIED SCIENCE DEGREE to all students who successfully complete their programs. This Associate of Applied Science (A.S.) Degree program has been authorized by the State of California Department of Education, the same agency that authorizes all associate degree programs for junior and community colleges throughout the state. Accreditation is a system for recognizing institutions with the highest levels of quality, integrity and performance in the areas they serve.

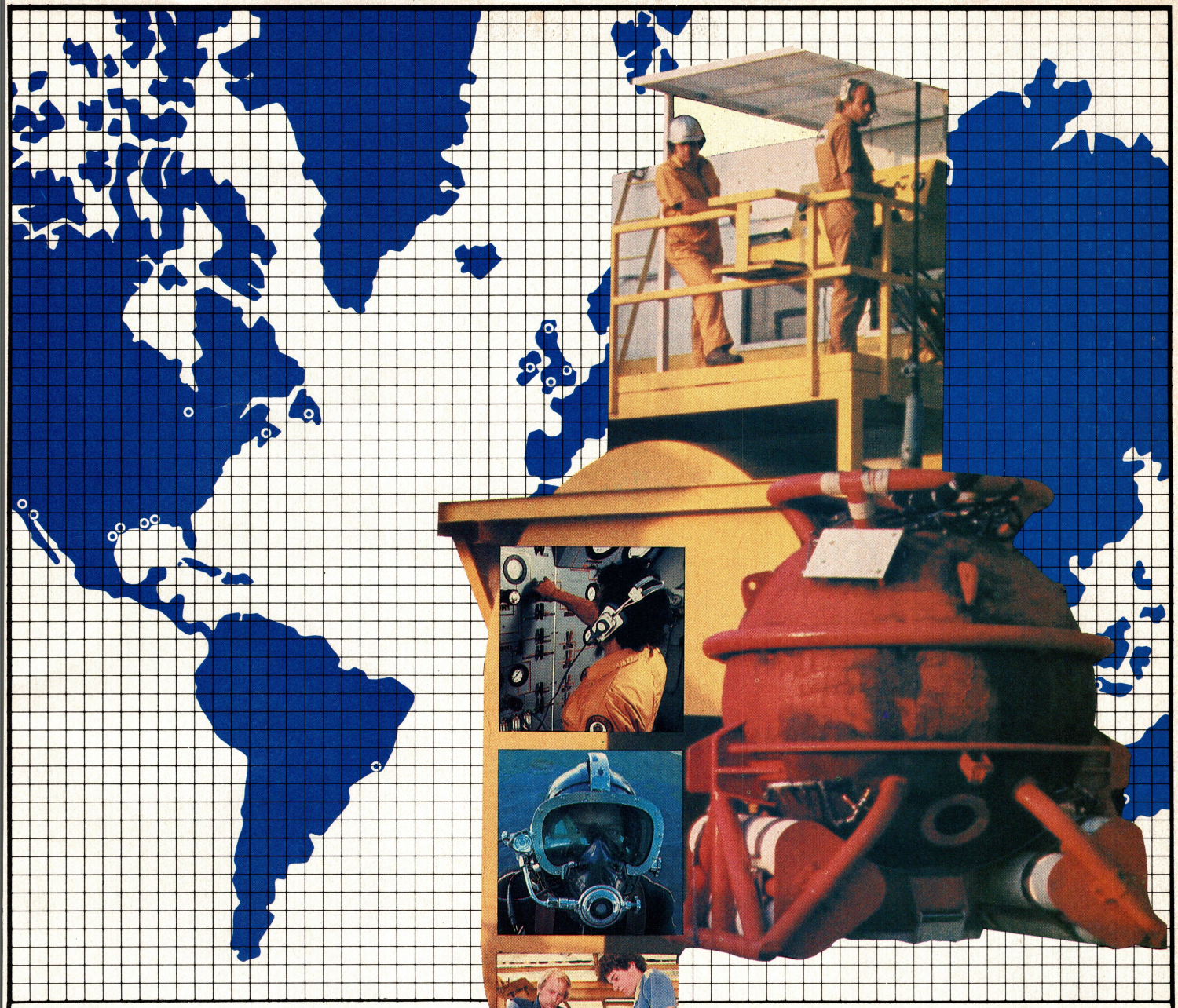
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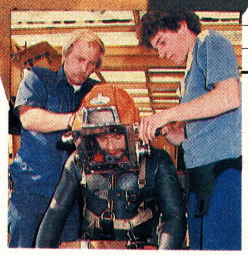
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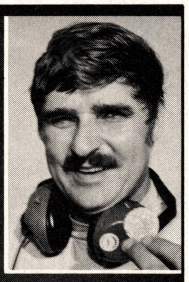
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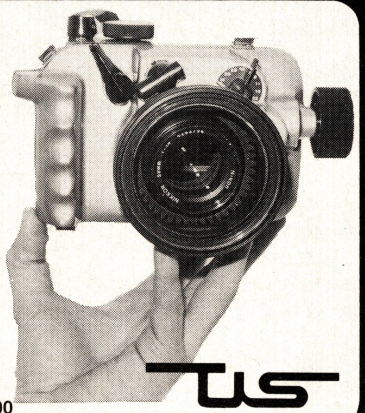
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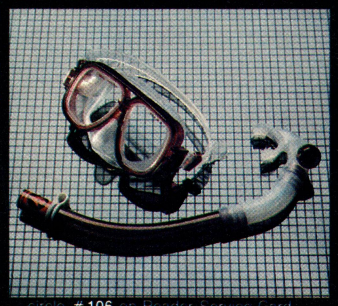
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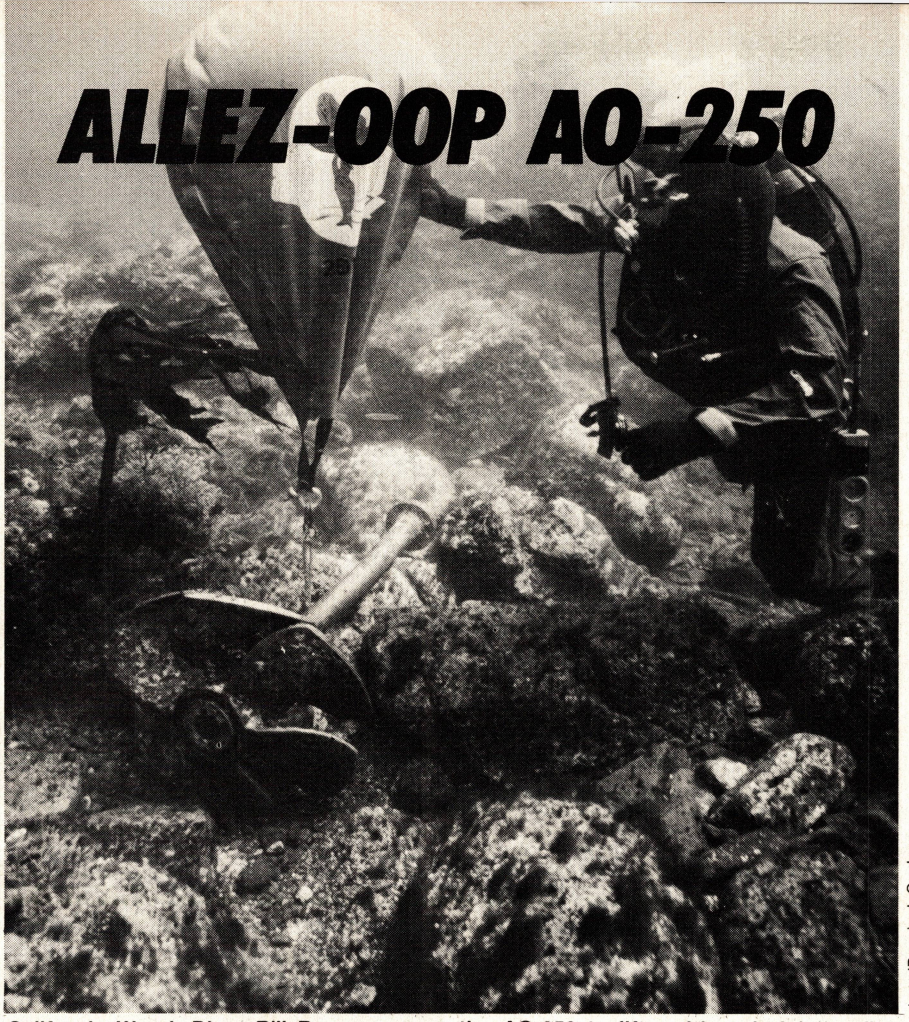
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ALLEZ-OOP AO-250



photo/Bonnie J. Cardone

California Wreck Diver Bill Bergman uses the AO-250 to lift a drive shaft/propeller.

BY JIM WALKER

Now that you've found that heavy anchor or boat propeller, how are you going to get it back to your boat? You might answer, "With a lift bag, of course." But, this is a big piece of metal, so you need a big bag. And, since you don't want this find to rip loose halfway up to the surface, you'd better make sure your bag is sturdy.

The Allez-Oop AO-250 lift bag will fit your needs. With a lift capacity of 250 pounds, it's big enough for most jobs a sport diver would want to tackle, and yet can easily be managed by you alone. Measuring (when lying flat) 30 inches at the widest point and 39 inches long, the bag can be rolled up and carried in one hand or stuffed into a large goodie bag.

The bag is sturdy. The skin is tough, decay-resistant orange PVC, reinforced with polyester. It has a 157 lbs./sq. in. tensile strength. All seams are welded (electronically controlled). Thus you don't have to worry about leaks, or thread rotting or tearing out. The support loop at the bottom of the bag is PVC coated polyester (one ton breaking strength), one and three-fourths inches wide. The ends of the loop are doubled at the points of attachment (one tab inside and one outside

(Continued on Page 44)

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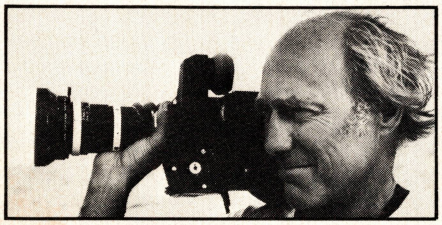
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ATLANTA DIVE SHOW

On July 9 Dive in Australia will present a special program for divers in the Atlanta area. The event will have dive equipment displays and cinematographer Stan Waterman's newest film on diving Australia's Great Barrier Reef. The displays and the film show are free to the general public. Drawings for many door prizes and a free trip will be offered.



Note: Formerly publicized at the Holiday Inn in Atlanta, the show now will be held at the Dunfey Atlanta Hotel, I-75 at Howell Mill Road, Atlanta, Georgia. A special rate for those staying overnight at the hotel will be available if the show name is mentioned.

For futher details contact Dive in Australia (415) 928-4480 and/or AT Reef Ventures (800) 327-REEF U.S. toll-free; Florida or Canada (305) 524-0106.

STAN WATERMAN SHOW IN CAYMAN

Underwater cinematographer Stan Waterman will present his show for the first time in a Caribbean destination. The evening performance, scheduled for July 28, will be a benefit to raise money for Cayman's recompression chamber, maintained by the Cayman Islands Divers.

The hour long show will feature a selection of Waterman's films, and will be held in the Cinema on West Bay Road.

Waterman and *Jaws* author Peter Benchley will be on Grand Cayman filming a 30 minute production on Cayman's dive attractions July 13-30, and Waterman volunteered his services to aid the local dive community. The Cayman film, sponsored by Spanish Cove with cooperation from Cayman Airways, will premiere at the 1984 DEMA show in New Orleans.

DIVER'S UNLIMITED TREASURE HUNT

The ninth annual Divers Unlimited Treasure Hunt will be held in Hollywood, Florida, on Sunday July 17. Last year 2000 divers participated.

Prizes valued at over $10,000 will be awarded to those who partake. Grand prizes this year are dive vacations to Cozumel, Mexico and the Florida Keys. The Keys trip will be to Divers Unlimited's newest resort facility in Marathon. Additional prizes will include tanks, BCs, regulators, masks, snorkels, and more!

The Treasure Hunt is open to all certified divers free of charge. All you have to do is stop by Divers Unlimited at least 24 hours prior to the dive and register. You will be required to show a C-card at this time. All divers must have a BC and an SPG. Each buddy team is required to have a dive flag attached to a float.

For more information stop by Divers Unlimited at 6023 Hollywood Blvd., Hollywood, FL 33024.

USSC TREASURE HUNT

On August 21 the United States Scuba Council will hold its first annual Underwater Treasure Hunt at Pearl Lake, in South Beloit, Illinois. South Beloit is about 60 miles north of Rockford.

Divers will hunt for buried treasure chests, with a pirate's map (and clues planted along the way). The treasure chests will contain doubloons worth points. The points will be totaled up at the end of the day. Each diver will select the prize that he/she wants, starting with the first place diver with the most points and ending with the last, with the least points.

Participants can also compete in the contest for best pirate costume (everyone is encouraged to dress up). There will also be a prize for this contest winner.

For details write the USSC at P.O. Box 331, Downers Grove, IL 60515.



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The Disc-Case I is designed to work with cameras that have no folding front cover such as the Kodak Disc 4000. The Case features an optical grade plexi front and a Water Correcting Lens which allows these cameras to focus underwater as close as 2 feet and as far away as 5 feet. These features result in sharper more colorful photographs. The Disc-Case I will operate to depths of 150 feet.

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U.S.D. Corp (formerly U. S. Divers Co.) has recalled all of its Aqua-Lung® Pro Line BC Jackets (P/N 7653, 7657, 7658, 7663 & 7667). A potentially hazardous problem may exist with the overpressure relief valve of the BC Jackets which might make it difficult or impossible for the diver to maintain desired buoyancy.

Do not dive with these BC Jackets until they have been field retrofitted.

All Pro Line BC Jackets should be taken to an authorized Aqua-Lung® Dealer or Repair Center for the free installation of a new overpressure relief valve.

Only Aqua-Lung® Pro Line BC Jackets with a black knob on the end of the manual dump cord of the overpressure relief valve are being recalled. BC Jackets with yellow knobs on the manual dump cord have already been retrofitted. For further information, consumer may telephone U.S.D. Corp collect at 714-540-8010.

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Diver's Calendar

July 9-10 Third Annual Monterey Beach Dive Photography Competition. Sponsored by Alameda Divers. (Contact: Steve Rosenberg, c/o Divers Exchange, 649 Pacific Ave., Alameda, CA 94501)

July 10 Third Annual New England Divers Treasure Hunt at Cat Island, Marblehead, MA. Registration deadline July 1. (Contact: New England Divers, 131 Rantoul St., Beverly, MA 01915)

July 24 Second Annual Wisconsin Dive Jamboree. South Shore of Devil's Lake State Park, Baraboo, WI. Treasure Hunt and prizes. Sponsored by Badger State Divers Club. (Contact: Badgers, P.O. Box 505, Wauhesha, WI 53187)

July 30-31 Eighth Annual Lynn Lynch Memorial Spearfishing Tournament, at Lake Ouachita. (Contact: Little Rock Scuba Divers, 3408 S. University, Little Rock, AR 72204)

August 7 Long Island Divers Association Third Annual Expedition Aqua-Women, aboard the dive boat *Deep Adventure* from Oak Beach Inn, Oak Beach, Long Island, New York. (Contact: Edith Hoffman, 33 Briarwood Road, Wheatley Hts., NY 11798)

August 27-28 26th Annual Colorado Diving Council Skin and Scuba Diving Championships, Grand Lake. Open to all certified divers. (Contact: Kenneth Fox, 1923 Berkeley, Pueblo, CO 81004)

September 11 Fourth Annual Divers Swap Meet. Sponsored by the Santa Ana College Dive Club. On the pool deck at Santa Ana College, 17th and Bristol Sts., Santa Ana, CA. (Contact: Jim Taylor, 22011-J Rimhurst Dr., El Toro, California 92630)

September 12-16 Topics in Marine and Diving Medicine at Isles of Shoals, Portsmouth, New Hampshire. Co-sponsored by Colby College and the Undersea Medical Society. 25 hours of Category I, PRA. (Contact: R.H. Kany, Director of Special Programs, Colby College, Waterville, Maine 04901)

September 23-25 The Ninth Congress of the European Undersea Biomedical Society (EUBS), Hotel Ritz, Barcelona, Spain. (Contact: Secretariat, IX Congress de la Societat Europea de Biomedicina Subaquatica, Sepulveda, 45-47, Barcelona 15, Spain)

October 1 Long Island Divers Association First Annual Fall Festival, at West Hollow Jr. High School, Old East Neck Road, Dix Hills, Long Island, New York. (Contact: Program Chairperson Bob Autere (516) 473-2886)

It's exciting down there. But no one topside really knows just how exciting it is. And just talking about it doesn't help. But it's easy to bring back all the excitement of every dive with the Nikonos IV-A. The Nikonos IV-A is a 35mm camera with a highly reliable, highly accurate automatic exposure system.

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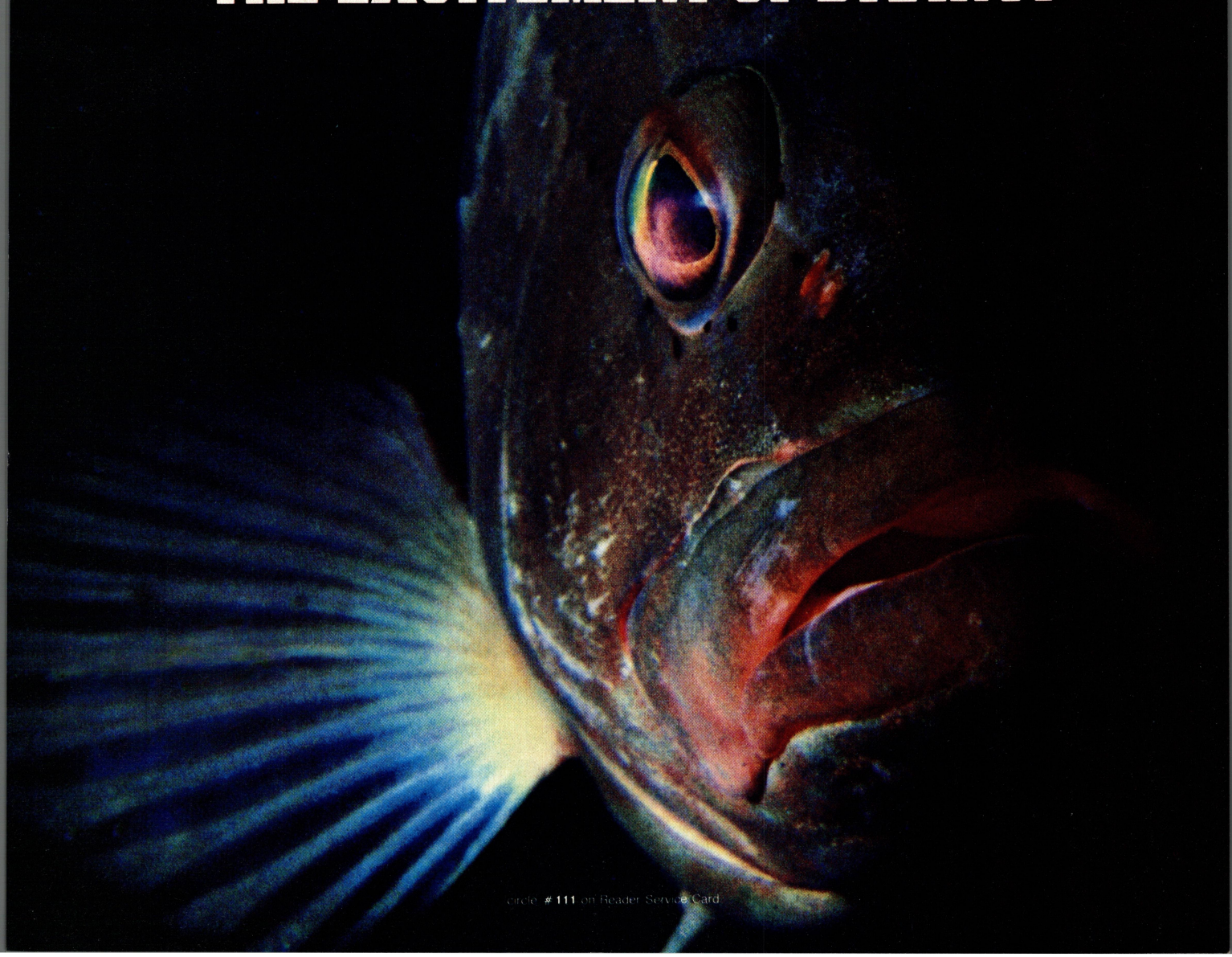


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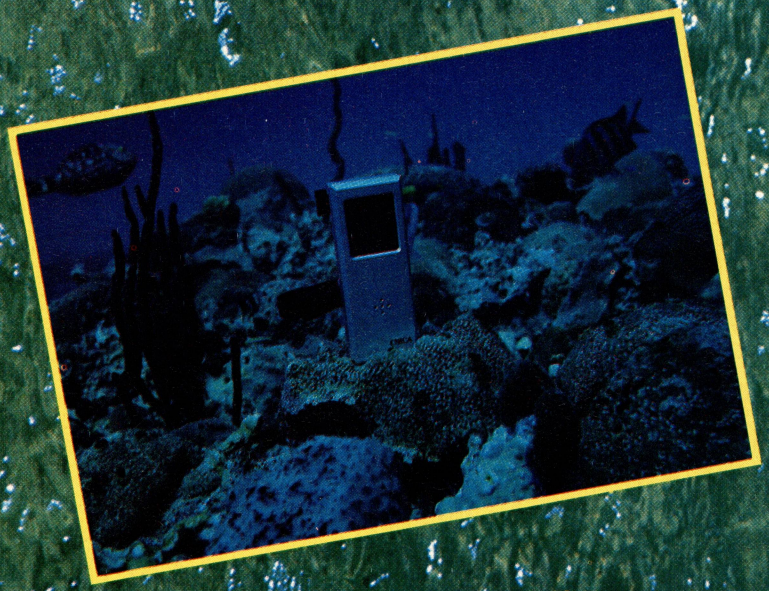
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Technifacts

BY E.R. CROSS



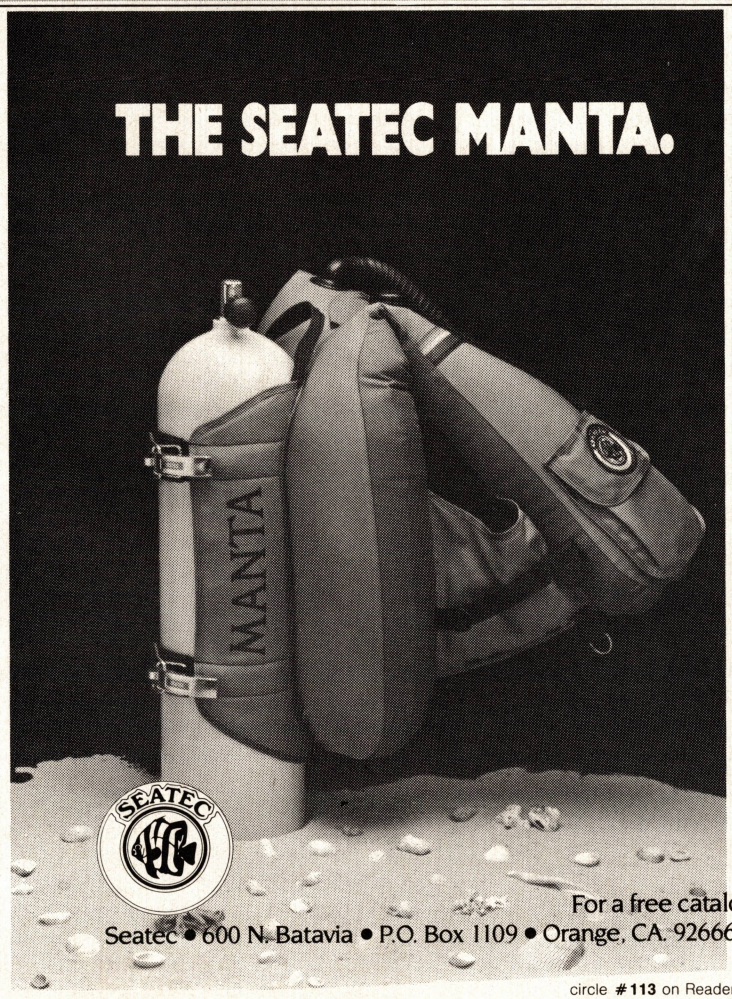
Stiff and bone tired from hours of confinement, a diver inched his way out of the steel decompression chamber complex at the Hyperbaric Treatment Center at the Look Laboratory in Honolulu, Hawaii. On March 30, 1983 Guy Muranaka was the first bends victim to be treated in Hawaii's not yet dedicated, community sponsored bends treatment center. The chamber from which the diver climbed was not officially open for treatment of dive accident victims until the dedication ceremonies on April 4.

According to Dr. Martin Rayner, chairman of the Department of Physiology at the John A. Burns School of Medicine at the University of Hawaii and coordinator of the Hyperbaric Center's activities, the center exists because many volunteers worked together for several years to get a needed service into operation.

Probably never has so complex an effort had such excellent cooperation by so many branches of government; the state, U.S. Navy, federal government, University of Hawaii Medical School, nurses, doctors and paramedical personnel. The Honolulu fire department rescue teams will be trained to operate the chamber and to work as "first responders" in a dive emergency. And last but certainly not least, the people of the State of Hawaii, but particularly the dive community, have volunteered endless hours and a great deal of talent to get the treatment facility ready for dedication and in full operation. Diver Muranaka was glad the volunteers were well ahead of schedule when he was striken with the bends following a series of dives.

The center's administrative assistant Frank Farm, who is also president of the Hawaii Council of Diving Clubs, has been the major force in getting more than 60 volunteer divers trained as outside tenders for the chamber operation. A 20 year diving medical officer, Rear Admiral (USN Ret.) Charles Waite is volunteering his time as medical director of the chamber facility. Ed Hayashi, the facility's master diver, has directed the work of numerous other volunteers in building second floor offices, designing and installing the necessary wiring and piping and equipping the chamber for operation.

The dedication and commissioning of the complex marks two advances in Hawaiian dive history. First, the medical school assumed the responsibility from the U.S. Navy for treating bends cases in Hawaii. Secondly, the equipment to be used for bends treatment provides an expansion of the medical school's capacity for research into causes and treatment of bends, as well as other therapeutic uses of the hyperbaric facility.



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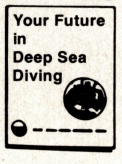
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TECHNIFACTS

The actual number of bends cases treated by the Navy facility at Pearl Harbor over the past 30 years varied from four per year in the early 1950s to 10 cases in 1970, 75 cases in 1977 and down to 62 cases in 1982. In the past 20 years the average number of cases per year requiring chamber treatment has been 60. Until July 1, the U.S. Navy was the back up for the state's treatment facility. After that date the Navy treatment facility was discontinued.

The new multipurpose hyperbaric facility has several decompression chambers that will work in three important areas; treatment of decompression sickness, dive research, and training of future diving medical personnel.

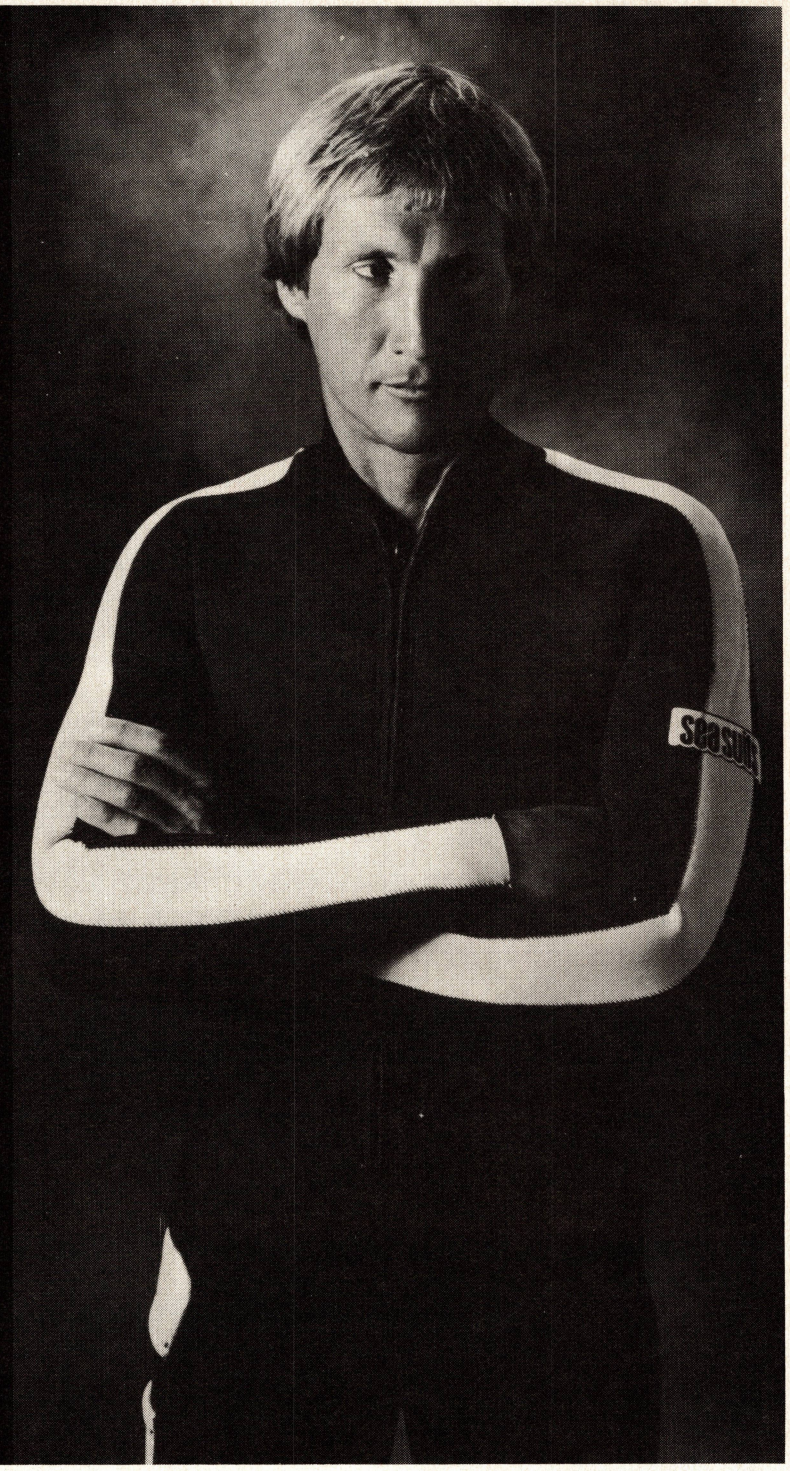
Director of the research part of the facility is Dr. Edwin Beckman, a former Navy diving doctor who is now a professor of physiology at the University of Hawaii. The chamber he uses is a Hahn and Clay Series 600 diving system with a maximum working pressure of 300 psi (about 670 fsw).

In the treatment facility the primary chamber is a Pittsburg-Des Moines Steel Company chamber that is 72 inches in diameter by 17 feet long. It is a double lock unit with a working pressure of 105 psi (about 230 fsw). This chamber was formerly used at the Makai Range research center across the island from Honolulu. It has been rewired, repiped and refitted. The chamber is ASME coded and was manufactured in 1968. It is equipped with BIBS (Built In Breathing System) oxygen supply, the exhaled oxygen being discharged through an oxygen dump system, thus preventing a build-up of oxygen in the chamber.

The chamber can be operated as a one valve system with only the valves outside the chamber controlling pressure or as a two valve system where pressure can be controlled from either inside or outside. Air to the chamber is controlled by means of metering valves requiring several turns to either open or close them. The discharge from the chamber can be controlled by a ball-type dump valve that opens the valve completely with one-quarter turn, or by a metering valve. All piping is fitted with check valves that allow air to flow in only one direction. Loss of air from the chamber in the event of piping failure is also prevented by the check valves.

The chamber's air supply is from a very large high pressure storage system composed of, at present, seven cylinders each having a capacity of 1500 cubic feet of compressed air. The treatment facility has 25 additional cylinders available each capable of holding 1500 cf of air

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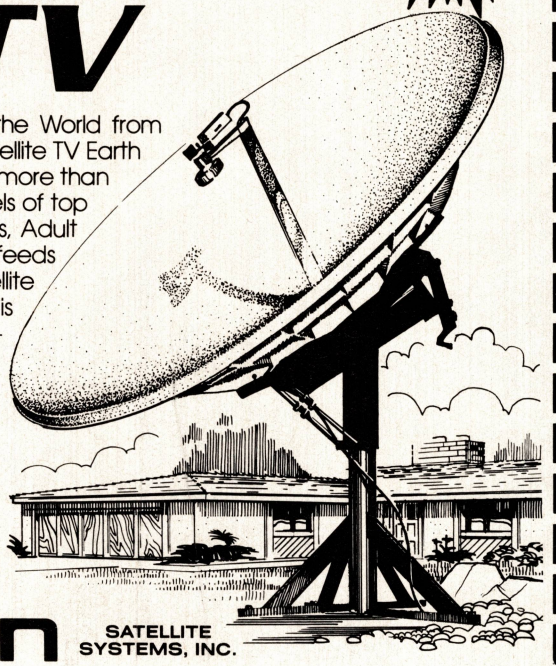
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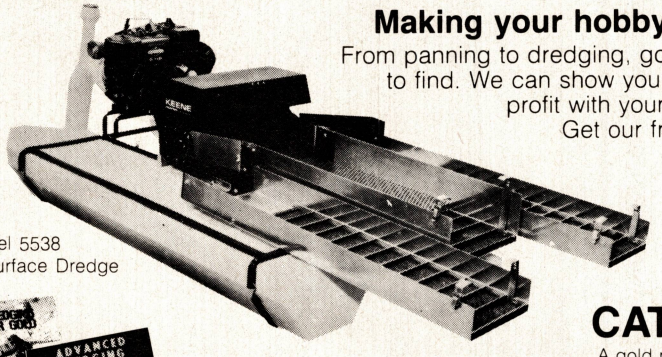
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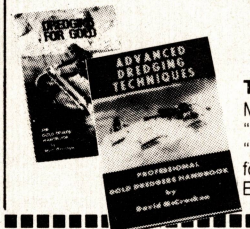
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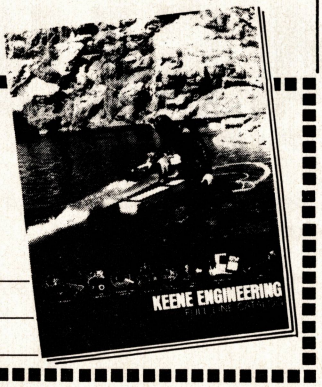


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TECHNIFACTS

(37,500 cf). These will be installed in the near future.

Air compressors used to fill the air cylinders are, at present, one Rix Hp 17 acfm at 3000 psi and one Rix Hp 20 acfm at 3000 psi. On order is a Rix Hp 30 acfm 3000 psi unit. Medical breathing oxygen is stored in 16, 200 cf cylinders (3200 cf) piped to the chamber through control valves and to the patient, the inside operator, tender or doctor as required, through BIBS mask units. The oxygen is dumped overboard instead of into the chamber with almost no build-up of oxygen in the chamber. This makes it possible to vent and circulate the chamber much less frequently. The primary chamber circulation schedule is at present one minute every ten minutes. A total of five BIBS masks are available inside the chamber.

For communication a dual system is provided with basically open mike communication from either direction. The mikes and headsets inside the chamber are fitted with noise cancelling systems to blank out the noise of air rushing into and out of the chamber.

A back-up chamber is available at the facility that can also be used as a primary treatment chamber. This is a Marine Dynamics chamber 54 inches in diameter and 12 feet long. It, too, is a double lock unit and has a working pressure of 130 psi (almost 300 fsw). This chamber is also ASME and Coast Guard approved for use. It was manufactured in 1973 and has a BIBS oxygen dump system.

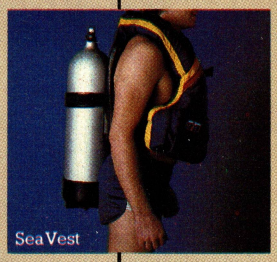
A fourth, smaller, one lock Galiazi chamber is also at the facility but is rarely used. It is, however, serviceable.

Once in recent years the Navy had a really bad weekend for divers with bends: There were seven cases in a two day period. All the Navy's chambers, at the submarine escape training facility and on each of the salvage and submarine rescue vessels, were full of civilian divers who had failed to follow the rules of decompression. If such a rash of bends were to occur after the Navy facilities are no longer available, it would truly tax the Hawaii chamber complexes. Probably six patients at one time would be a workable limit for the hyperbaric facility, and then with difficulty.

Divers, medical and rescue personnel, and others interested in the chamber complex have received hands-on training in the chamber operation, in tending the chamber and in the responsibilities of the outside tender and time keeper and scheduler of events in the treatment profile. Also they are checked out in post dive maintenance requirements of the

(Continued on Page 28)

Reason number one: **SeaJacket IV.** Every ounce of flotation is exactly where you need it. Its curved shoulders, tailored buoyancy chambers and front and side adjustments provide divers with a comfortable, natural fit. The backpack and jacket are designed as one integrated unit for better balance. And a padded "body band" eliminates the need for shoulder straps and a crotch strap. It all adds up to more comfort, no "chest squeeze" and less tendency to roll or ride up.



SeaJacket IV has other premium features too, like extra hold-downs, specially designed pockets, and retainers to secure the backpack when you're not using a tank.

Reason Number Two: **SeaVest.**

It's SeaQuest engineering at its best, combining the best features of both the jacket and the front mount B/C. The SeaVest is easy to get in and out of, and its low center of buoyancy lets you float head up, high out of the water, and swim easily in a natural position. Its padded "body band", shoulder straps and integrated backpack provide a comfortable, secure fit, eliminating the need for a crotch strap.

SeaJacket IV and SeaVest. Two good reasons to buy SeaQuest.

Send $2.00 today for full color Mares and SeaQuest catalogs of premium diving equipment. SeaQuest decal and emblem included.

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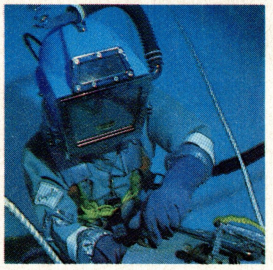
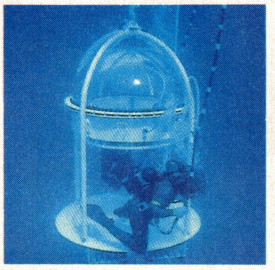
TWO REASONS WE ROSE TO THE TOP.



(SEAJACKET IV AND SEA VEST)

Want to work in the diving industry? Come to the world's best commercial diving school...



Photos by LARRY CUSHMAN

Come to Houston!

About a third of the world's entry-level professional divers are trained at the Ocean Corporation in Houston. We're the biggest and the best...and the commercial diving companies in our area know it. Last year more than 50 different diving companies hired our people. More divers are hired in Houston than any place in the world. Houston is the oil, offshore construction and commercial diving capital of the world.

If you are interested in becoming a professional diver, remember these facts about the Ocean Corporation.

We teach everything you need to know to immediately go to work.

We run complete night courses as well as our regular day classes.

We have the largest full-time training staff of any diving school... anywhere.

Most of our instructors are active inshore and offshore commercial divers.

We pioneered bell diver training, in-house welding training, ASNT-level inspection diver training and Diver Medic certification.

We have our own diving division which performs specialized industrial diving operations, such as underwater NDT inspection and nuclear powerplant repair work.

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We'll help you get your first diving job.

Remember, all commercial diving schools are not alike. Check them out. Visit the school if you can. Look for real commercial diving professionalism and reputation, adequate facilities and equipment, experienced instructor staff, decent housing and living conditions, and, probably most important to you, ask them how they plan to help you get your first job in the commercial diving industry.

If you want to be a professional diver, contact our Admissions Department. Use the Reader Service Card or call us collect at (713) 661-0033. You'll be glad you did.





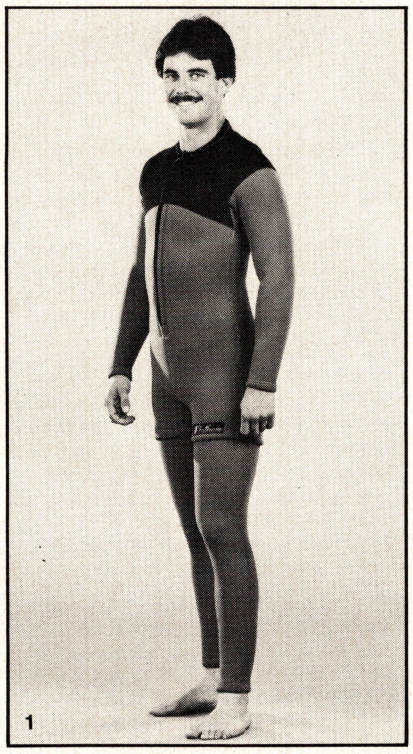




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1983 SUMMER SHOPPER'S GUIDE



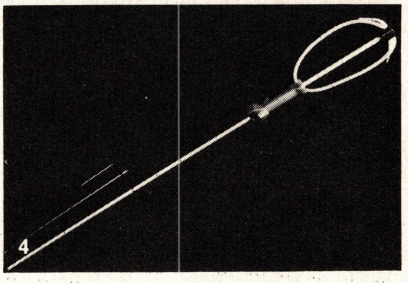
1 Wetsuit—The Island Sport wetsuit is made of either Sea-Flex or Durasoft foam neoprene. These stretchy materials allow the long sleeve shorty to be slipped over the farmer john pants. A French cut version is available for women. ⅛ inch Sea-Flex shorty and farmer john combination $250. Fathom dealers.



2 Long Blade Fins—Rondine Gara fins feature long nylon blades attached to rubber reinforcing ribs and full foot pockets. Reinforcing ends 9½ inches from tip of fins to give more flexibility, resulting in increased speed and power. Sizes available include 7-8, 8-9, 10-11 and 12-13. All sizes $99.90. From Cressi-sub.



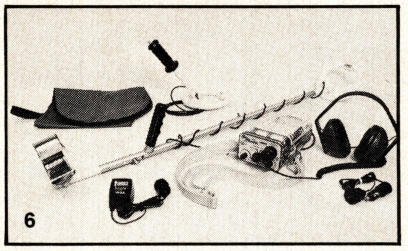
3 Regulator Bag—The SSPRB Padded Regulator Bag measures 18 x 13 x 3 inches. It has an inside divider, an outside pocket, and an adjustable shoulder strap. Padding protects regulator, including octopus and instrument console. $46.95. Scuba Systems, 826 Horan Drive, St. Louis, Missouri 63026-2478.



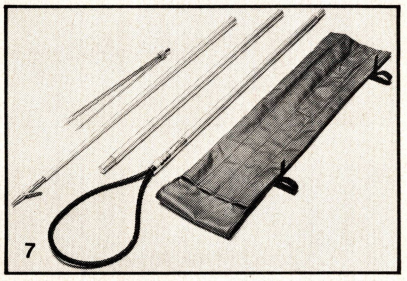
4 Hand Spear—The Spear-It SR 302 Hand Spear features a textured grip with a convenient thumb trigger and safety lock. Five foot aluminum spear disassembles into two parts for easy transport. Accepts all 6 mm tips. $47.50. From Spear-It Corp., 21 Ledin Drive, Avon Industrial Park, Avon, Mass. 02322.



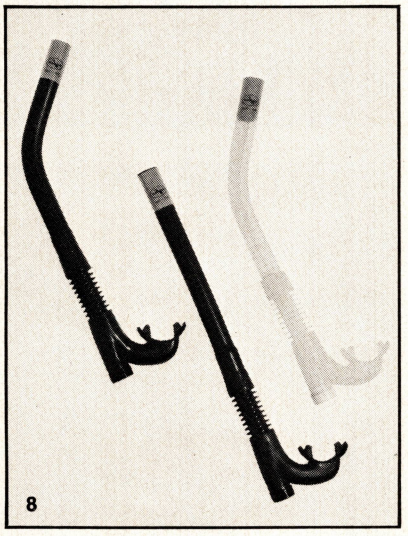
5 Transponder Tester—Measuring 1¼ x 2½ x 4¼ inches, model 5410 Bell Transponder Tester checks transponders operating on emergency channels A and B (38.5 and 39.5 kHz respectively). Operates on a 9 volt transistor battery. $400. From Helle Engineering, Inc., 7198 Convoy Court, San Diego, CA 92111.



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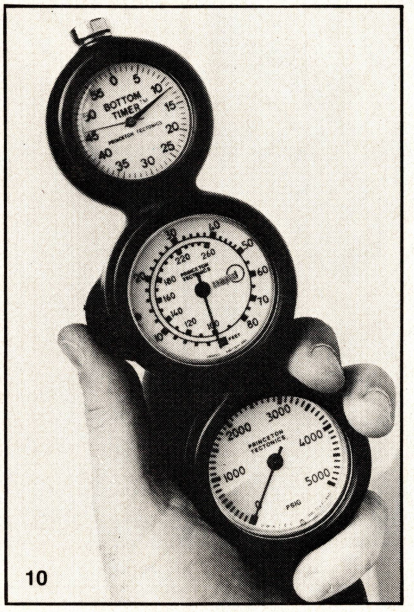
6 Metal Detector—XL500 detector has pulse circuitry, adjustable discrimination and sensitivity, rechargeable batteries, land/sea (to 200 feet) operation, headphones, meter and a choice of searchcoils (two optional). $695. Garrett dealers or contact Garrett Metal Detectors, 2814 National Dr., Garland, TX 75041.

7 Polespear—The aluminum JBL Travel Polespear is easily disassembled for travel. Model 2D72 comes standard with a 303 stainless steel paralyzer and single barb spearpoint. Nylon case has Velcro closures. $56.95. From JBL dealers or contact JBL Enterprises, Inc., 426 W. Almond Ave., Orange, CA 92666.

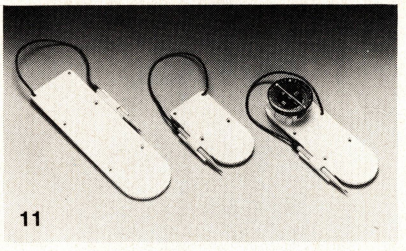
8 Flex Snorkels—Turbo Vent Flex Snorkels feature self draining for easier clearing at the surface. Flex section has a smooth inside to further ease clearing. Snorkel comes in all black with choice of contoured tube or straight tube ($16). A silicone mouthpiece version has clear contoured tube ($19). From Dacor.



9



10



11

9 Regulator/Console Combo—The MK IX High Performance Regulator is available preassembled with instrument console. System includes 3300 psi submersible pressure gauge and 150 foot oil filled depth gauge. System comes packaged in regulator/instrument carrying bag. $368. From Scubapro dealers.

10 Dive Gauges—PVC console fits Princeton Tectonic's Bottom Timer, Depth Gauge and Pressure Gauge. Console features easy adjustment of depth gauge. Compass can be mounted behind Bottom Timer. System with PG-1 (brass housing) SPG under $250, or with PG-2 (plastic housing) under $220.

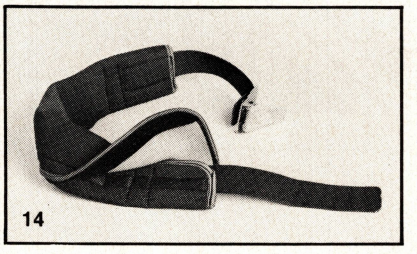
11 Console Slates—Complete with pencil and retainer cord, slates attach directly to bottom of Scubapro two and three gauge consoles. Two gauge model is available with a compass mount feature for the LS-1 compass. Two gauge slate alone, $8; three gauge, $9. Two gauge with compass, $37. From Scubapro.



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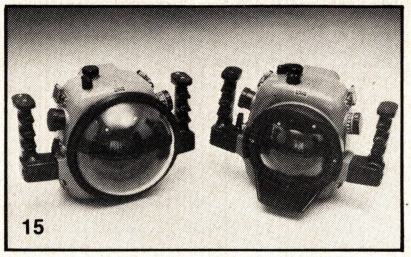


14

12 Dive Monitor—The Vanguard No-Decompression Monitor checks dive parameters automatically and continuously during your dive, including: present depth, maximum depth, bottom time, and surface interval. $295. At dive shops or contact Aquatechnology, Inc., 14000 N.W. 19 Ave., Opa Locka, FL 33054.

13 Binoculars—Steiner Commander model binoculars feature a dampened, illuminated compass which shows the exact bearing of the observed object. Seven x 50 binoculars weigh 40 percent of conventional marine models. From $149-$499. From Pioneer & Co., Inc., 216 Haddon Ave., Westmont, NJ 08108.

14 Pocket Weightbelt—Three millimeter thick nylon two neoprene weightbelt has pockets (Cordura reinforced bottoms) which accept lead weights. Velcro closing cover. Belt has a stainless quick release buckle. Men's size accepts approximately 35 pounds of lead weights, women's, 25 pounds. $32. Tabata.



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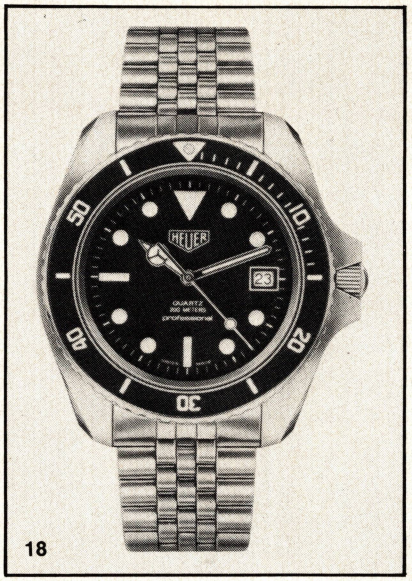


17

15 Camera Housing—Designed for motorized 35 mm SLR cameras, the Aquatica II features fingertip controls, epoxy body and easy film changing. Ports available are eight inch dome, flat, or standard dome. $1125. Aqua Vision Systems, P.O. Box 1097, Postal Station Pointe-Claire, Quebec, Canada, H9S 4H9.

16 Ladies' Suits—Jean-Michel Cousteau Signature Suits from U.S. Divers come in women's small, medium, large and extra large. One quarter inch nylon two neoprene, the suits include farmer john pants, and jacket with high collar. Wetsuits have five zippers and are navy blue with silver accent stripe. $275.

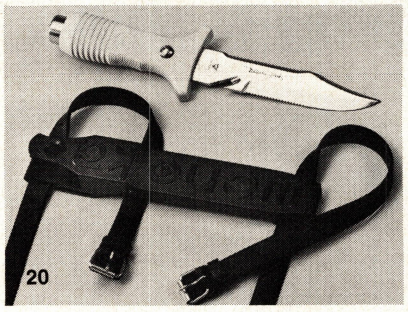
17 Carrying Bag—Mother Load Junior bag measures 18 x 10 x 10 inches. The bag features two water repellent pockets closed by double slider zippers, and a Velcro closed outer pocket. Bright blue 11 oz. Cordura nylon fabric with white zippers and trim. $65. From Sidpak, P.O. Box 7206, Tulsa, Oklahoma 74105.



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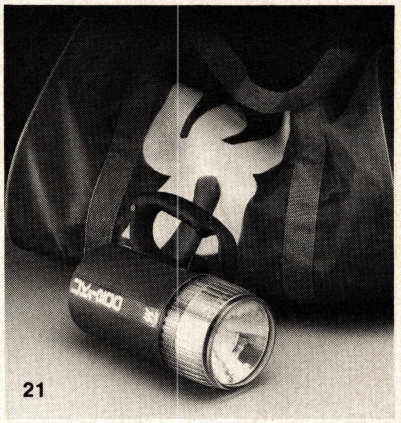


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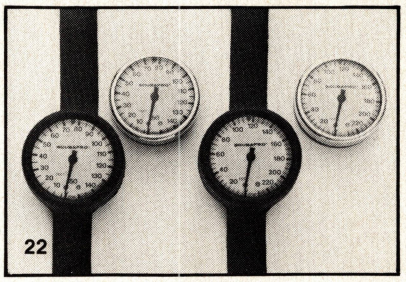
18 Gold Plated Watch—Heuer gold plated watches have matching bands and come in four sizes: Men's, Sportsman's (¾ size), Young Sportsman's or Unisex, and Ladies. 980.022 has Swiss movement, gold plated stainless case, water resistance to 660 feet, screw-in crown and one-way bezel. $435.

19 Gear Bags—Bag's Texturlure material allows dive equipment to drain, yet holds its shape and is unaffected by ultraviolet light, salt water, etc. Plastic zippers, 1½ inch poly straps, and D-rings for optional shoulder strap. Snorkeler (11 x 11 x 22″) $23.95. Mariner (13 x 15 x 27″) $31.95. Norlantic Enterprises.

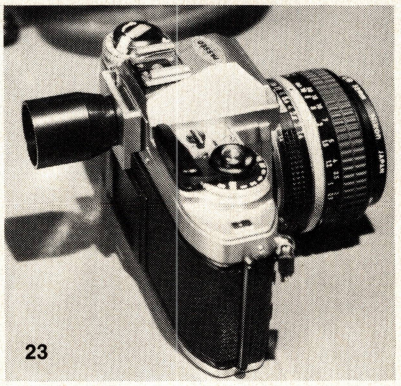
20 Dive Knife—Incorporating the Z-Lock sheath system, the 8535 knife has a six inch stainless steel blade with straight and serrated edges, and a line cutter notch. The handle has a solid stainless steel butt cap. Knife's overall length is 11 inches. Orange and black handles available. $52. From Wenoka dealers.



21



22



23

21 Handlight—The UK1200 non-rechargeable is Underwater Kinetics' brightest disposable battery dive light. The 7.3 watt lamp is powered by eight alkaline D-cells for a burn time of up to 12 hours. The 3.7 (diameter) x 8 inch resin case comes with a lantern or pistol grip and is rated to 500 feet. Appx. $45.

22 Depth Gauges—These oil filled depth gauges have accuracy to plus or minus one percent of full scale throughout the range of the dial, between 36 and 90°F. Has luminous face. Two models, 150 feet and 230 feet, with neoprene housing and wrist strap, or ready for console $63 to $75. From Scubapro.

23 Large Image Viewfinder—The SLR Super-Eye allows for full frame, through-the-lens focusing by magnifying the image in the standard SLR viewfinder. Super-Eye comes standard with most SLR and SLR MD-36 cases. Older housings can be updated with a new rear cover and the Super-Eye ($125). Ikelite.

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Avon has everything you're looking for in a dive boat: safety, stability, speed, spaciousness, and portability. And the durable Avon fabric is guaranteed for five years. Write for free catalog to Avon West, 1851 McGaw Ave., Irvine, CA 92714; Avon East, 151 Mystic Ave., Medford, MA 02155.

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ARKANSAS SPEARFISHING TOURNAMENT

On July 23 a summer benefit spearfishing tournament, sponsored by the Bull Shoals Park Commission, will be held on Bull Shoals Lake, Arkansas. Proceeds of the tournament will be donated to the Bull Shoals City Park, a project which is now under construction.

The tournament will be headquartered out of Bull Shoals Lake Boat Dock, with cash prizes, trophies and dive gear awards in both rough and game fish categories. Three place awards will be given in each category for the largest fish and largest stringer. Dive gear will also be given away in a drawing. Entry fee for the tournament is $15 and will include a party, where prizes will be awarded.

For more information contact tournament chairman, Dianne McKenzie, Box 514, Bull Shoals, Arkansas 72619.

DIVERS DEN ANNIVERSARY

The Divers Den of Baltimore, MD is celebrating its 25th year of service. It is the oldest professional dive store in Maryland. Some milestones along the way include president Joe Dorsey's underwater endurance record in 1958; Dorsey's receiving early instructor certification from ISA (#28), NAUI (#53), and NASDS (OWI #375); and the formation of the Eastern School of Skindiving, a subsidiary of Divers Den.

Along with the Travel Committee and ALM airlines, Divers Den is now offering dive trips direct to Bonaire from Baltimore/Washington International Airport (BWI). The trips run from Saturday to Saturday and include roundtrip air fare, airport transfers, room and taxes as well as an unlimited dive package. Non-diver rates are also available. Those interested should call Jeannie at (301) 668-6866.

For information on Divers Den and its summer celebrations, contact Divers Den, Inc., 8105 Harford Rd., Baltimore, MD 21234.

NEW MEXICO SPEARFISHING

The Second Annual Sandhill Divers Spearfishing Tournament will be held at Conchas Lake State Park in New Mexico on July 30. First, second and third place winners will receive cash prizes. Door prizes will be donated by dive equipment manufacturers.

For more information contact Sandhill Divers, P.O. Box 1404, Clovis, New Mexico 88101; or Randy's Scuba, 117 East Seventh St., Clovis, NM 88101.

4 DIVER UPDATE

omega™ precision regulators



Autonomic response... means the body breathes in and out automatically, in or out of the water. Unless you find yourself concentrating on inhalation and exhalation cycles while you dive. When you own a premium regulator, you shouldn't pull for airflow or push to exhale. Breathing should be easy, smooth and natural. Enter the Omega regulator. Immediately notice that it breathes simultaneously, with you, not after you. No surge, no unpleasant feedback; just gentle, effortless breathing.

Third stage. Typical engineering begins at the tank and concentrates on cold, hard facts. Oceanic starts with you, the third stage. First we provided air flow rates in excess of human needs. Then we added our exclusive hot-water moldable mouthpiece tabs for elimination of jaw fatigue. The clear, clean, optional silicon mouthpiece completes the picture.

Second stage. We created a **downstream** servo-controlled air valve by looking at airflow from your point of view, not the tank side. The air valve is dynamically balanced allowing airflow rates in excess of needs throughout **your** operational needs. We arrange the multiple discharge ports so you don't see bubbles. The flush mounted purge button is perfectly located for thumb operation. The Oceanic Omega second stage is completely stable in or out of your mouth, in shallow water or deep. Here is quality and value you can count on.

First stage. For a perfect second stage performance we wanted a stable intermediate pressure of 135 PSI. We have researched for years how to produce stable pressures, more stable than anyone else bothered to demand. The Omega regulator breathes easy at both high **and** low tank pressures. Plus the first stage air volume is capable of supporting four low pressure ports for accessory hoses.

Photographer's note: An Oceanic Omega regulator will put an end to your favorite model having "hub-cap mouth."

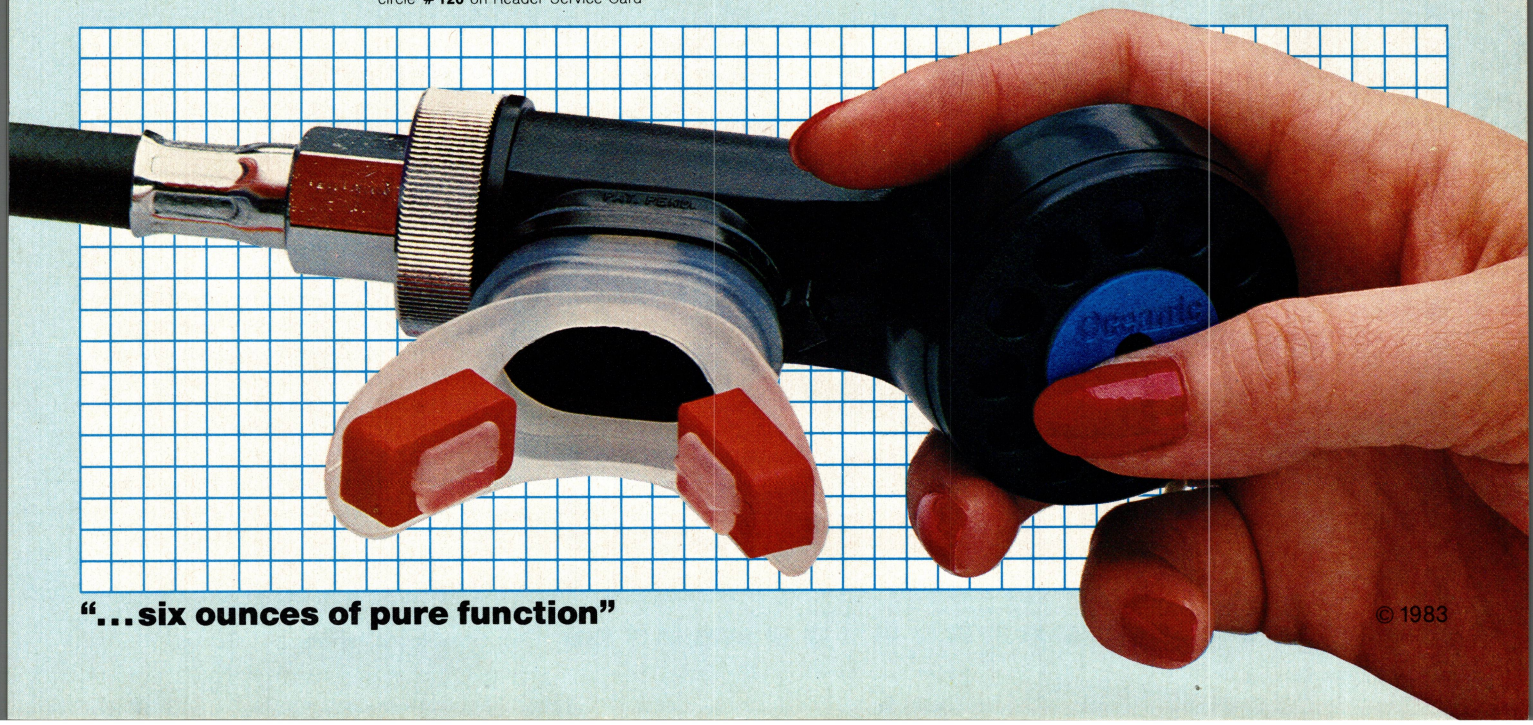
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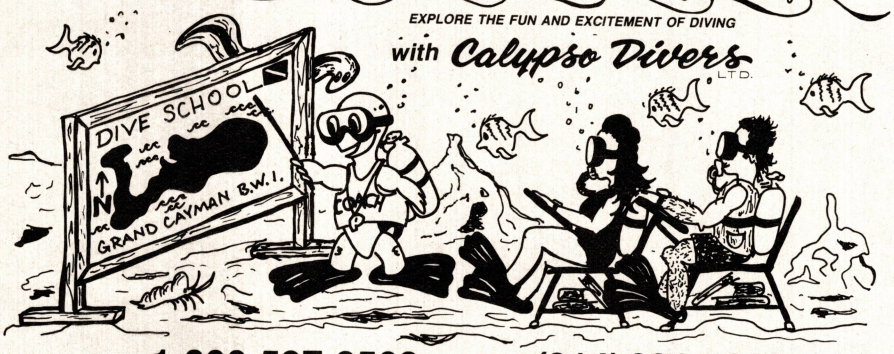
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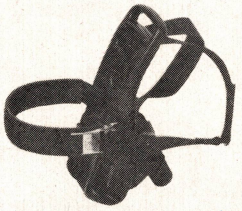


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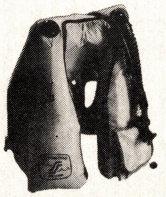
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PADI has also seen substantial interest in the new PADI Environmental Orientation decals, which allow a diver's experience in a variety of different environments to be indicated on his/her certification card. Within two weeks of their introduction, PADI had already distributed more than 10,000 of these decals to dive retailers and resorts.

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TECHNIFACTS

(Continued from Page 20)

chamber, the air supply, the oxygen supply system, electrical and communication systems and in chamber fire prevention. Special sessions are held on safety.

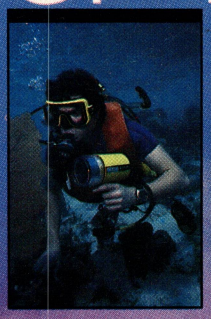
The U.S. Navy did a study of the average amount of decompression the bends victims treated had missed. In 1976 the average amount of missed decompression was 47 minutes. In 1977 the average was 73 minutes. One diver recently treated required a total of over 100 minutes of decompression for the amount of time and depth of his diving.

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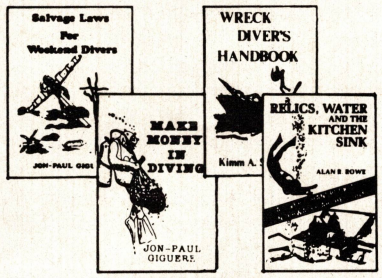
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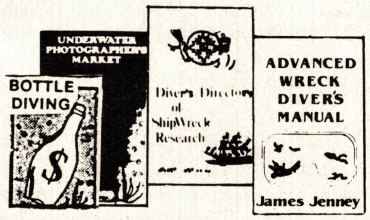


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Rx FOR DIVERS

BY FRED BOVE, M.D., PH.D.

Kenneth Kizer, M.D. M.P.H. is this month's guest columnist. A former Navy Diving Medical Officer, he currently practices environmental and hyperbaric medicine in Oakland, California.

Even though the safety of scuba diving during pregnancy has been much discussed by dive medicine experts in recent years, there continues to be a lack of definitive scientific data on the subject. Nonetheless, there is enough evidence about possible hazards to the unborn fetus and expectant mother that all potential diving parents should be aware of certain concerns.

Among the concerns of the pregnant diver are a possible increased risk of decompression sickness (the bends) developing in both the mother and fetus; possible harmful effects on the fetus from exposure to higher than normal pressures of oxygen, carbon dioxide and other gases; possible adverse effects of marine animal envenomations; and increased susceptibility to injury in the later stages of pregnancy.

Contradictory data exist on the risk of decompression sickness developing in the fetus of experimental animals. In the early studies on decompression sickness Haldane found bubbles in the fetuses of bent goats, i.e. both mother and fetus suffered the bends. More recently, studies with dogs and rats subjected to simulated dives in dry hyperbaric chambers suggested that the fetus might be more bends resistant than the mother animals. Subsequently, though, it was reported that simulated 100 foot no decompression dives in pregnant sheep produced massive bubbling in fetuses whose mothers had no bubbles. These seemingly conflicting results were at first thought to be owing to anatomical differences in the placentas of the animals, with the sheep being more like humans. This implied that human fetuses were more bends suscep-

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tible than their mothers. However, later studies indicated that the apparent marked susceptibility of fetal sheep to decompression sickness was probably just an artifact of the way the experiments were done, i.e. it was related to the tubes that were placed in the animals to monitor bubbles. Thus, at this time, the scientific evidence is unclear on this important question, although there remains considerable concern about the risk of the fetus developing decompression sickness.

In addition to the question of the fetus being at greater risk of developing decompression sickness, the effect of *any* bubble formation in the fetus must be considered. It is well known that bubbles may be present in the bloodstream after diving but cause no overt symptoms of decompression sickness. The source and significance of these silent bubbles in divers is currently being investigated by several researchers. Presumably, they cause no problems because they are relatively few in number and are filtered out of the blood in the lungs and, possibly, the liver. However, the circulation in a fetus is different: The blood is shunted around the lungs and liver by special blood vessels, the reasons for which need not be discussed here. (Suffice it to say that this is an adaption to intrauterine life and that these blood vessels normally close off at birth.) Thus, it is more likely that a fetus would suffer serious damage if it had any bubbles in its bloodstream because they would be more likely to embolize the brain, heart and other vital structures. Such an embolism might cause both immediate damage to the affected organ as well as altering its normal development.

Also of concern to the expectant mother is the possibility that she may be at increased risk of getting the bends because of the accumulation of body fluid. The resultant tissue edema may change the normal ability to get rid of excess nitrogen that dissolves in the body when submerged. Likewise, many women store increased amounts of body fat during pregnancy. Since nitrogen is many times more soluble in fat than in lean tissue, this increased amount of body fat might lead to the uptake of more nitrogen than can be eliminated on presently used decompression tables. Both of these pregnancy related body changes could increase the likelihood of the prospective mother succumbing to the bends.

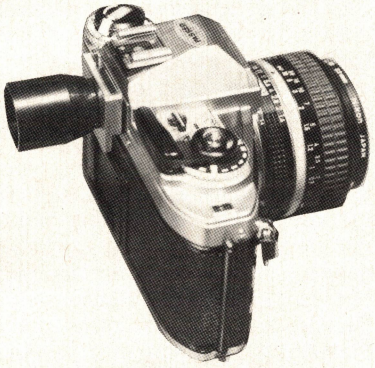
If there is an increased risk of developing decompression sickness then there is also an increased chance that the pregnant diver might have to be treated with recompression and hyperbaric oxygen (HBO). Oxygen at increased pressure

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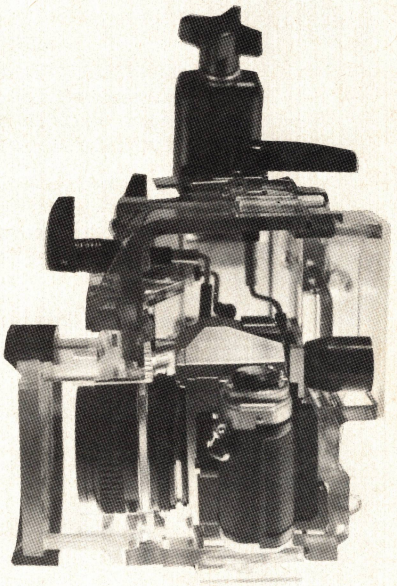
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Rx FOR DIVERS

may be very damaging to the fetus. In a study of pregnant rats subjected to HBO similar to that used in treating the bends almost all of the fetuses died after a single exposure. In addition, other problems may develop in fetuses which are not killed. For example, they might be blinded, such as sometimes happens when premature infants are given high concentrations of oxygen.

Despite the sizable number of women scuba divers today, there is little information available on women who actually dived during pregnancy. In the only survey done so far 5.5 percent of the women divers had an obstetrical complication or a child with some kind of birth defect. In addition, 12.5 percent of the infants born to women who dived deeper than 100 feet had a problem. Although most of the problems were minor and expected to occur with some frequency, the percentage of abnormalities seems high for a generally young and healthy maternal population. However, the study was only a survey, and more data are needed before these findings can be interpreted.

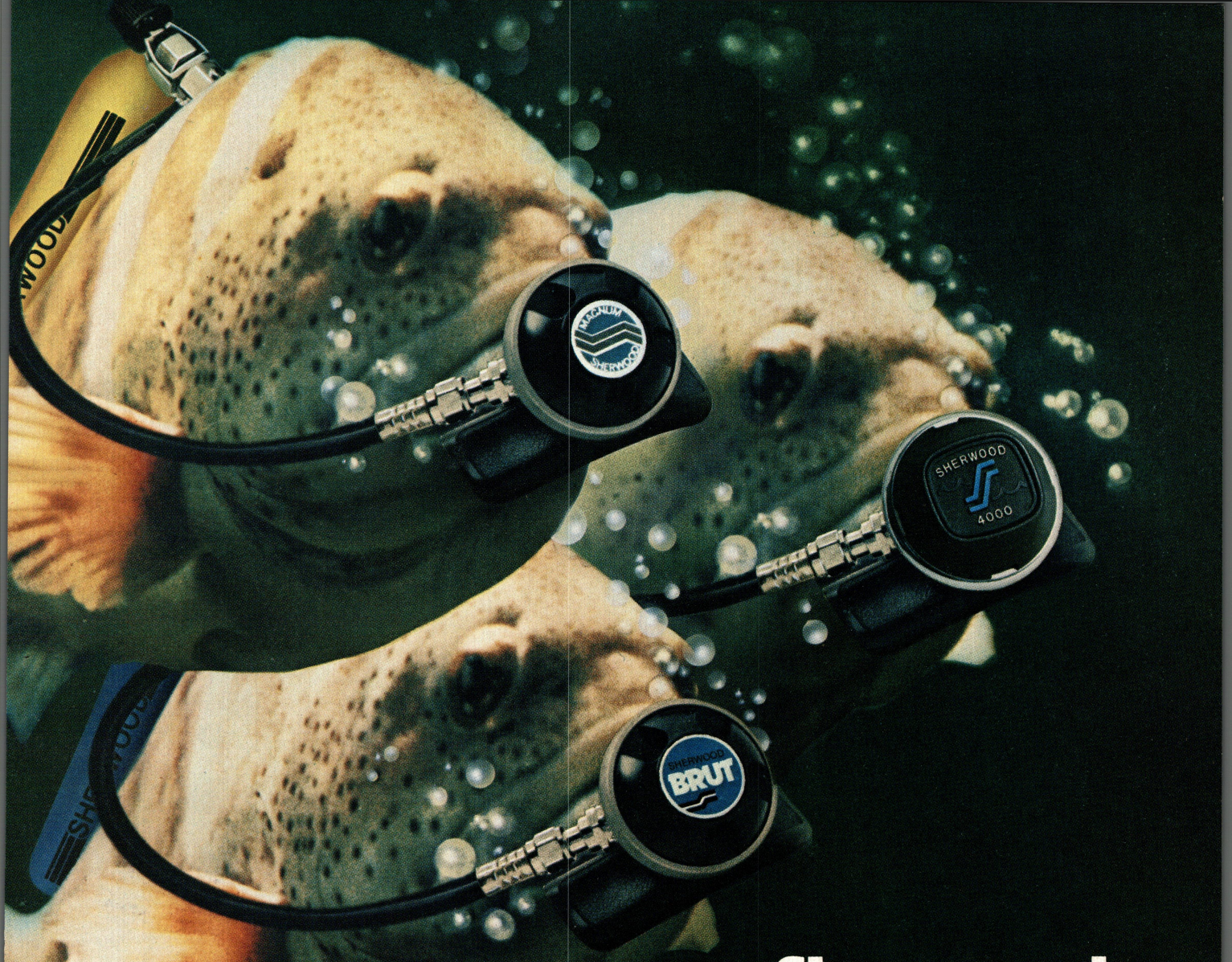
Another area in which little is known is the effect that marine animal envenomations (e.g. stings from jellyfish or cone shells) have on the unborn. Although there is no reason at present to believe that Portuguese man-of-war or other envenomations per se are dangerous to the fetus, these injuries can occasionally cause severe generalized reactions in the mother which might be dangerous to the fetus. Thus, it would seem wise to avoid all potential exposures to venomous marine life when pregnant.

With advanced pregnancy there is a tendency to become clumsy because of increased size and weight. If this is combined with wearing heavy and sometimes awkward dive gear, getting fatigued, having motion sickness, being pushed around by waves or surge, or being exposed to some of the other things that sometimes happen when diving, it seems that the pregnant diver subjects herself to a considerable risk of getting injured. Trauma to either the mother or fetus could be catastrophic.

Along this same line, some women report an increased susceptibility to motion sickness during pregnancy. In view of possible harmful effects on the fetus of the various anti-motion sickness medications, there is no justification for taking these drugs when pregnant just so that one can go diving.

On the basis of the foregoing considerations it should be clear that there are a number of reasons why pregnant women should not dive, although there is no reason that they cannot enjoy the many

(Continued on Page 48)



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It would take a very large book to tell you everything you need to know about game collecting. A partial list of edible seafood includes: lobsters, octopus, abalone, sea urchins, moon snails, scallops, sea cucumbers, fish, sea anemones, mussels, conchs, barnacles, crabs, clams and limpets. Everywhere divers dive there is some kind of game to be found. And, the type of game and techniques used are different from coast to coast and ocean to lake. Thus, what we will try to do here is give you enough information to help you get started.

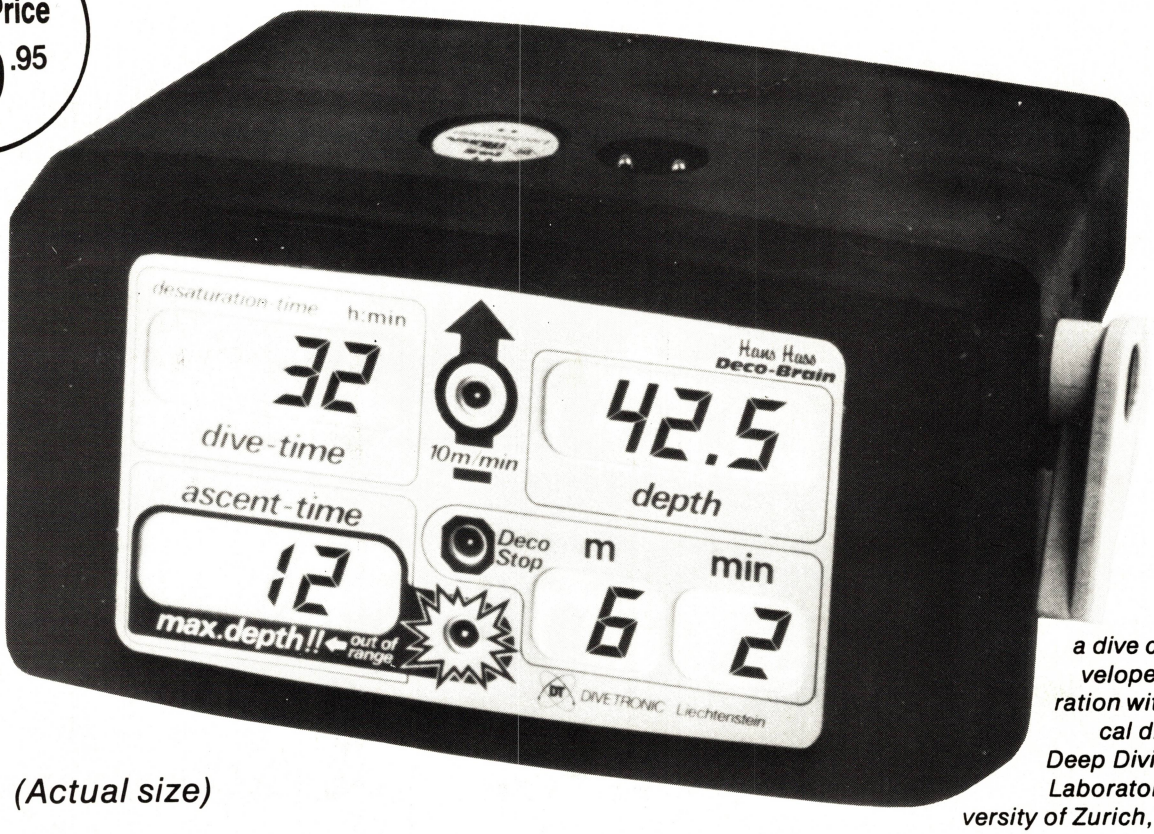
Before you first attempt to collect any game, find out if you need a fishing license and buy one if necessary. Also obtain a set of recent fish and game laws for your area. Fishing licenses are very inexpensive: The fines levied when one is caught without one are not. Fish and game laws change yearly, so a copy of the newest ones is a must. Both fish and game licenses and regulations are available at sporting goods stores and departments and at tackle shops on the docks from which dive and fishing charter boats depart.

It is best to master one skill at a time. Decide what your primary game target is and learn the regulations pertaining to it. If you can find a book telling you about the habitat and habits of your particular game so much the better. Books on marine life are available from dive stores, instructor organizations and

(Continued on Page 123)

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Suggested Retail Price
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(Actual size)

***Deco-Brain**, a dive computer developed in collaboration with the technical director of the Deep Diving Research Laboratory of the University of Zurich, Switzerland.*

Hans Hass Deco-Brain® *(Patent Pending)*

The World's First Solid-State Dive Computer *(Based on CMOS technology)*

The all-in-one unit for greater diving safety.

- *For all divers who desire improved safety and greater diving pleasure.*
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A dream becomes reality

In today's diving world, the watch, depth gauge, diving table and decompression meter are artifacts of the past since the Deco-Brain not only consolidates their functions, in one unit, but due to its ultraprecision, unnecessarily long decompression times are eliminated to provide longer dives.

The world's first, solid-state dive computer from DIVETRONIC not only replaces all conventional instruments, it substantially increases diving pleasure and safety for every diver.

With the Hans Hass Deco-Brain, the dream of unencumbered diving has become a reality. For the first time in diving history, a microcomputer takes the plunge.

The **Deco-Brain** calculates the nitrogen saturation and desaturation of eight different «tissues» using half times of (5–635) minutes. New, computer-compliant calculation procedures developed in collaboration with the technical director of the Deep Diving Research Laboratory, Switzerland, permit optimum determination of the decompression plan for any dive profile.
In short, when calculating the decompression plan, the **Deco-Brain** considers the many stops of varying length a diver makes at different depths just as precisely as the dive case history which may consist of a random number of repetitive dives and surface intervals. All of these continually varying values are considered twice a second in the calculation of the decompression plan.
Dive and surface interval data is recorded precisely at any elevation between 0 and 3500 m (11,500 ft) above sea level.
The extremly wide functional range of the **Deco-Brain** covers every possible diving case. The decompression plan for dives to 70 m (230 ft) is calculated by the **Deco-Brain** just as precisely as the required desaturation period during the surface interval after a dive. Since the computer immediately records even the slightest air pressure fluctuations and includes these factors in the continual calculation, the **Deco-Brain** displays precise data even if the diver drives over a mountain pass or is in an airplane during the surface interval.
Consequently, the recording of measuring values, processing of data, and calculation of complicated conversions are no longer performed by the diver but by this revolutionary dive computer – the Hans Hass Deco-Brain – as the following example illustrates:

Example: Dive without residual saturation.
Range: (0–700) meters (2,300 ft) above sea level.

The decompression plan for this dive (in this case only 5 min. at 37 m (121 ft) must be calculated with conventional dive tables as if it were a 56 min. dive at 40 m (131 ft). The resulting decompression plan is then unreasonably long.

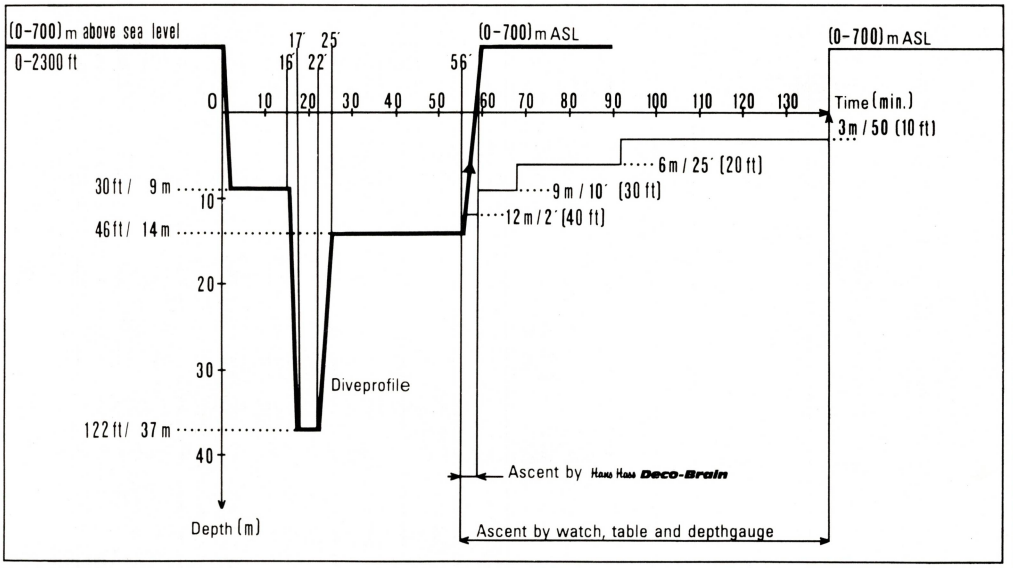
Decompression plan for 60 minutes, 40 m (131 ft)-according to the dive tables of the Deep Diving Research Laboratory, Zurich, Switzerland:

2' stop at 12 m (40 ft)
10' stop at 9 m (30 ft)
25' stop at 6 m (20 ft)
50' stop at 3 m (10 ft)

The decompression time in this particular plan is 87 minutes which probably very few recreational divers would observe. Therefore, improvisation is an everyday practice.

The decompression plan determined by the Hans Hass Deco-Brain is as follows:
No decompression required. Non-decompression limits are observed.
If a dive to 40 m (131 ft) for 60 minutes were actually made, the **Deco-Brain** would show the above-mentioned decompression plan since it is programmed with the same half times and oversaturation limit valves used by the dive tables of the Deep Diving Research Laboratory, Switzerland.
Compliance in this case can be verified at any time by simulated dives (e.g. by lowering the **Deco-Brain** on a line and subsequent reading of indicated data by a diver at the respective decompression depths).
In short, highly dangerous, improvised decompression times can be totally avoided with the Hans Hass Deco-Brain. Only the **Deco-Brain** can record the variety of data during the dive, process it and calculate the optimum decompression time for every dive which, in turn, is displayed by an easily readable countdown.

Apart from these advantages, the universal application possibilities in the range of 70 meters (230 ft) depth to 3,500 meters (11,500 ft) above sea level, the reliability and optimum determination of the decompression plan, the **Deco-Brain** gives the diver even more:



The test report of the Deep Diving Research Laboratory, university of Zurich warrants for the correctness of the decompression plan displayed by the **Deco-Brain**, we wish to acknowledge the assistance of Mr. B. Schenk, technical director of the Deep Diving Research Laboratory, in the development of the dive computer in which the electronics and software engineers of DIVETRONIC Instruments AG in Liechtenstein invested three man years.

The Bottom Line

The Dive Computer

Walter Keusen,
Diving Instructor SUSV/CMAS
and contributing editor of AQUANAUT, an international dive sport magazine, puts the Hans Hass Deco-Brain to the acid test

«A dream comes true» – or so proclaims the manufacturer of a new unit which relieves the diver of depth gauge, decompression meter and dive tables.
Granted – effortless diving will only come true with the use of this new dive computer which conveniently unites all instrument functions.
To get to the bottom of things, so to speak, «AQUANAUT» recently put a prototype of this novel dive computer to test. The outcome in a nutshell: The dream has become a reality.

Our test report

A prototype of the *Hans Hass* **Deco-Brain** supplied by DIVETRONIC was used during more than 20 dives during which all functions were tested under diverse conditions. A conscious effort was made to avoid uniform dive profiles so that tests would observe actual dive conditions as closely as possible. All displayed data was compared with values calculated on the basis of relevant dive tables. To determine the entire working range of the **Deco-Brain**, our tests included dives to 70 meters (230 ft), three to four repetitive dives as well as conscious violations of the basic rules of diving. The underlying consideration in this respect was to ensure that individual divers and subsequent purchasers would be detered from hazardous experimentation during diving.

Deco-Brain operation

Switch-on/Measurement and display of atmospheric pressure.

The **Deco-Brain** must be switched on before entering the water for measurement and storage of the ambient air pressure used as a basis for depth calculation. The atmospheric pressure is indicated in millibar in the dive time display for 10 seconds. The dive computer then calculates the decompression plan from the measured atmospheric pressure.
According to manufacturer's specifications, the resolution of the air pressure measurement is 100 m air column. A comparison with a calibrated mechanical barometer yielded the same results for all intents and purposes.

Time measurement

A quartz clock module handles time measurement and the LCD display indicates whole minutes. Time measurement automatically begins at a depth of 1.5 meters and is automatically cancelled after ascent to 0.5 m (1.5 ft). During the diver's surface interval, the **Deco-Brain** indicates the desaturation time in hours and minutes instead of the dive time.
Compared with a chronometer, the **Deco-Brain** kept precise time for the observed period of 10 hours.

Depth gauge

The accuracy of the integrated electronic depth gauge is 50 cm. The 10 cm/H_2O resolution of the pressure measurement was confirmed by the response point of a measuring strip suspended from the water surface.
Due to the greater density of saltwater (approx. 1.025 g/cm^3), a greater pressure results compared to the same depth in fresh water and, in turn, a greater depth reading. Since the dive computer is intended for use both in saltwater and fresh water, the depth gauge electronics module was calibrated to a mean water density of 1.0125 g/cm^3. This results in a systematic error of +0.125 meter per 10 meters (33 ft) in fresh water. Conversely, this error is negative by approximately the same value in saltwater, but it is well within display accuracy for conventional sport diving to a depth of 40 meters.

Rapid ascent warning lamp

A LED warning lamp starts blinking if the diver's ascent rate is too rapid. However, if the display blinks in 1 sec. intervals or slower, the diver is ensured that his ascent rate is approximately 10 m/min. An ascent rate of approximately 20 m/min is indicated as soon as the LED stops blinking and illuminates continuously.
When using the **Deco-Brain** for the first time, a controlled ascent seems to last an eternity. A comparison with the standard ascent rate verified that the **Deco-Brain** did not break the rules.

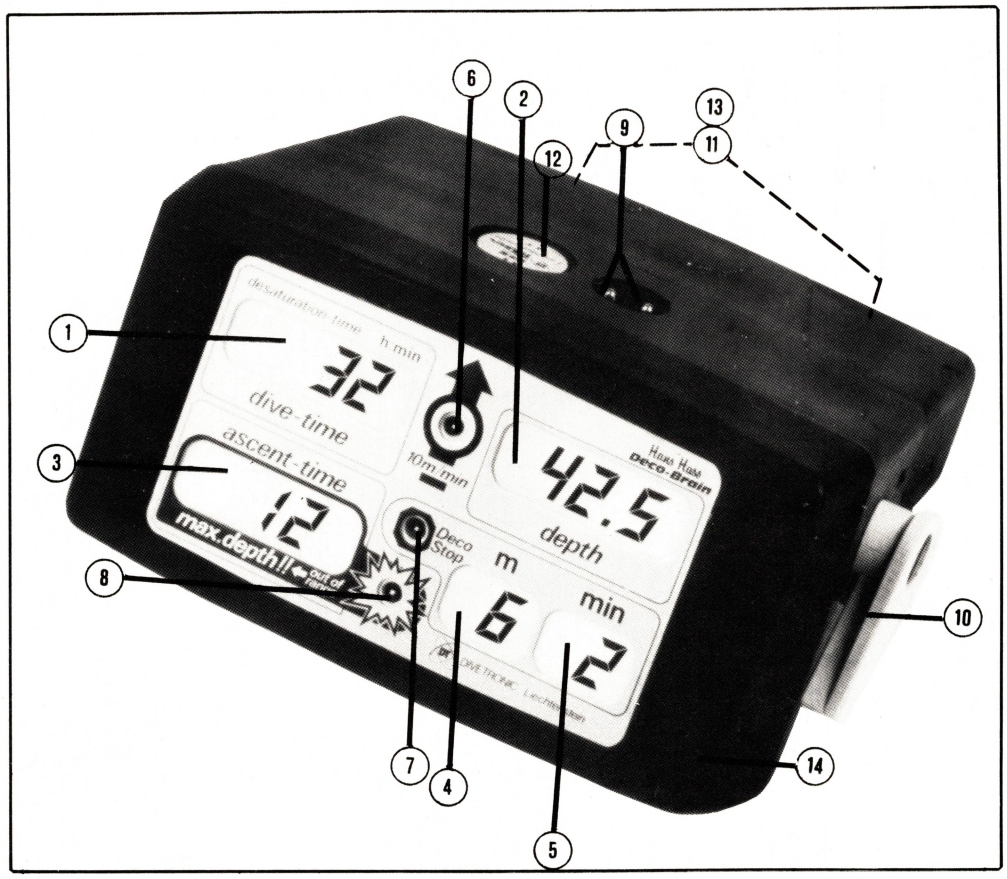
Nondecompression display

If zeros blink in 0.5 second intervals in the decompression depth and time displays, the diver is given a 2 minute warning before the nondecompression limit is exceeded. To maintain a nondecompression dive plan, the diver need only ascend until the blinking zeros extinguish. If an ascent is not made within 2 minutes, the time and depth of the first decompression stop appear in both displays. The nondecompression limit warning feature functions impeccably except for the fact that in many cases that 300 pound grouper swims into view precisely when display starts blinking – unnoticed by the diver. On test dives I made with the dive computer, the nondecompression dives totaled only half those originally planned; on the remaining dives, the **Deco-Brain** suddenly indicated a decompression stop was necessary.

Decompression dives

The first time I strapped the **Deco-Brain** on my arm before a dive, I was somewhat apprehensive about relinquishing my watch, depth gauge and tables. Even on successive dives, I carried conventional instruments as a safeguard. It was not until after I was fully satisfied that displayed decompression data coincided with values calculated from the tables that I decided it was safe to put my life in the hands of an electronic device.

Since the dive computer is capable of calculating complex dive profiles with many stops at many different depths with greater precision than the diver could hope to attain with tables, the **Deco-Brain** ensures greater time saving in



Specifications

Top-of-the line CMOS 8 bit microprocessor with 10 kByte ROM for assembler program and data base.

Peripherals
Four 4-digit LCD displays (digit height: 8 mm); easily readable even in intense sunlight and in turbid water. Three superintensity LEDs for major warning signal illumination. In addition, the decompression stop and ascent rate LEDs (no. 7) and (no. 6) permit safe ascent in extreme cases, i.e. in the event of lamp failure or in absolute darkness.

Power pack
Five rechargeable NiCd batteries for guaranteed operating period of more than 80 hours. Rechargeable from 12 V cigarette lighter or 220/110 V line voltage within 4 hours.
The Deco-Brain can also be recharged when calculating the desaturation time during the surface interval.

General
Impact-resistant, temperature shock-resistant, saltwater-proof injection molded housing. Guaranteed waterproof to a depth of 80 m (262 ft).

Weight 700 g; positively buoyant underwater.

Operating temperature range:
–10° to 50° C

Storage temperature range:
–40° to 50° C

Technical Specifications

1. *Air pressure display in millibar* (indicated for 10 sec. after unit is switched on)
– *Actual dive time* (during the dive)
– *Completed total dive time* (during 5 seconds per minute for the duration of the surface interval)
– *Actual desaturation time* (during 55 seconds per minute for the duration of the surface interval)

2. *Actual dive depth* (Accuracy: 0.5 m (1.6 ft))
– *Maximum attained depth* as a threshold value (together with the total dive time during 5 seconds per minute for the duration of the surface interval).

3. *Actual ascent time* (its calculation considers the ascent rate of 10 m/min. and the sum of all decompression stops.
– If display 8 illuminates («Out-of-range» mode) simultaneously, *the maximum attained depth* is displayed.

4. The *next decompression depth*

5. *Decompression time* in minutes which must be observed at the respective decompression depth.

(4+5) Blinking zeros provide 2 min. warning *before the nondecompression limit is exceeded.*

6. Red LED blinks *if the maximum ascent rate* (10 m (33 ft)/min) *is exceeded*; continuous LED illumination in the event of a 20 m/min ascent rate.

7. Red LED begins blinking 1.5 meters (5 ft) *prior to the first decompression level* and blinks as long as the countdown duration (displays 4+5).

8. Red Out-of-Range LED blinks in 0.5 second intervals when the diver: *Dives deeper than 70 m; dives longer than 255 minutes; exceeds maximum permissible saturation limit values due to several repetitive dives; dives in mountain lakes at elevations greater than 3500 m (11,500 ft); ascends to the surface from a depth of 7 m (23 ft) without completing decompression; switches on the Deco-Brain under water or switches it off and on again under water.*
In the «Out-of-range» mode, displays 4 and 5 are extinguished, displays nos. 1 and 2 continue normal operation while display 3 indicates the maximum attained depth. Consequently, the diver may now complete the dive according to his own estimates.

9. Charging connection consisting of *2 gold-plated contacts directly exposed in the water which do not require additional seals.*

10. *Power switch* which can only be activated by «pulling and turning» to prevent accidental unit switch-off under water. As an added feature, switch design is such that the diver must switch the unit on before fastening it to his arm.

11. *Flexible straps* for fastening unit to forearm or BC

12. *Piezoresistive pressure sensor*

13. *Sealed mounting screws*

14. *Impact-resistant plastic housing* with replaceable power pack. The housing has no openings for switches or cables; the electronics module and power pack are self-contained, airtight units.

Additional Advantages of the Hans Hass Deco-Brain

1 Operation

Operation of the **Deco-Brain** is extremely simple. Only the power switch (no. 10) must be switched on at the surface before the dive. Afterwards, **Deco-Brain** operation *is fully automatic and requires no further intervention.*

After the **Deco-Brain** is switched on, *it indicates the ambient pressure in millibar (display no. 1) for 10 seconds.* This permits the diver to check the pressure measuring system; in this manner, the **Deco-Brain** also functions as a barometric elevation gauge for diving in mountain lakes.

2 Pressure measurement system, depth gauge

The **Deco-Brain** automatically detects the change from air to the water. A pressure increase of only 20 m (8") water gauge is sufficient for storage of the ambient air pressure. The dive computer then selects the respective program step as a function of the ambient air pressure required for calculating the decompression plan and calculates the dive depth as a function of the stored ambient air pressure.

The ***Hans Hass Deco-Brain*** *indicates the dive depth with a resolution of 0.5 meters (1.6 ft) (display no. 2).*

The maximum permissible error of the depth gauge system in the (0–80) meter (262 ft) range *is less than 0.5 meters (1.6 ft).* The precision of such a depth gauge system has never been previously attained.

3 Total ascent time

During the dive, the **Deco-Brain** records the total ascent time (display no. 3) in minutes, resulting from the sum of all decompression stops and the time required for an ascent rate of 10 meters (33 ft) per minute. Consequently, it is substantially easier for the diver to determine the correct time for ascent *anytime during the dive.*

4 Dive time / desaturation time / logbook entries

During the dive, display no. 1 indicates the *dive time in minutes which has lapsed after a depth of 1.5 meters (5 ft) is exceeded.*

After ascent to the surface, the dive time stored by the computer is indicated in display no. 1 for 5 seconds per minute for logbook entry. The computer also provides the diver with a complete residual desaturation time countdown in hours and minutes as a function of the ambient air pressure for 55 seconds per minute. In addition, the computer indicates the maximum depth *for 5 seconds per minute* in display (no. 2) for logbook entry. The computer indicates both these factors (max. depth and total dive time) until the saturation time has attained «0» group. In the event of a repetitive dive, the computer *automatically* overwrites the stored logbook values with those of the new dive. During the surface interval, the indicated desaturation time provides a basis for optimal planning of the repetitive dive as well as information on the diver's degree of saturation after the dive. In addition, the **Deco-Brain** can be switched off to conserve power if the next dive occurs after the desaturation period has lapsed. *The* **Deco-Brain** *is reset by switching it off and on.*

5 Check of ascent rate

The red warning LED (no. 6) blinks *if the diver's ascent rate exceeds 10 m (33 ft) per minute.* If the red LED (no. 6) blinks in 1 second intervals or less, the ascent is between 10 m (33 ft) and 12 m (39 ft) per minute.

However, if the red *LED is continuously illuminated,* the ascent rate is *approx. 20 m (66 ft) per minute.*

6 Nondecompression limits display / decompression limits

Two minutes before the nondecompression limit is attained, *the zeros blink in 0.5 sec. intervals* in displays 4 (decompression depth) and 5 (decompression time). If the diver wishes to stay within nondecompression limits, he must only ascend to a level where the blinking zeros extinguish. If the diver does not ascend, the first decompression level and the respective decompression time are indicated by displays 4 (meters (ft)) and 5 (minutes) two minutes after the nondecompression limit warning. During another dive, outside the nondecompression limits, decompression requirements are increased step-by-step according to the tissue saturation. Displays for decompression depth and time always indicate the first decompression stop during the dive and the actual decompression level to be maintained during decompression.

7 Decompression countdown

The **Deco-Brain** starts the *decompression countdown* when the diver attains the tolerance zone of the first decompression level (approx. 1.5 m (5 ft) below the first decompression level). LED (no. 7) blinks to indicate the countdown. The diver must remain within the tolerance zone (+/- 1 m (+/- 3 ft)) of the displayed decompression depth (no. 4). LED (no. 7) remains illuminated as long as the decompression depth and time countdown to zero. The diver can ascend to the surface as soon as the decompression countdown LED (no. 7) has extinguished. *If the diver ascends to the surface during the decompression phase from a decompression depth of less than 7 m (23 ft), the Deco-Brain automatically interrupts the decompression countdown. The computer freezes all display values except for depth display (no. 2). The decompression LED (no. 7) extinguishes and the red «Out-of-range» LED (no. 8) starts to blink as a warning.*

However, if the diver returns to the required decompression depth within 1 minute, the countdown restarts and the «Out-of-range» warning extinguishes. At any rate, if the period at the surface is greater than 1 minute, the computer switches to the «Out-of-range» mode as described in section 8. Naturally, the diver may interrupt decompression at any time by diving 3 meters (10 ft) below the deepest (first) decompression level. Residual tissue saturation determined by the **Deco-Brain** resulting from interruption of the decompression phase is considered during the new dive.

8 Abnormal operation / «Out-of-range» mode

The Deco-Brain switches to the «Out-of-range» mode, indicated by the blinking of LED (no. 8), if the diver jeopardizes himself and his dive partner by the following actions:

- Ascends to the surface from a decompression depth of greater than 7 meters (23 ft);
- Interrupts the decompression countdown through repeated, brief ascents to the surface from a decompression depth of less than 7 meters (23 ft) for a period of 1 minute;
- Dives deeper than 70 meters (230 ft);
- Longer than 255 minutes (4 hours and 15 minutes);
- Exceeds maximum permissible limit values of the calculated degree of saturation through several repetitive dives;
- Dives in mountain lakes at elevations exceeding 3500 m (11,500 ft);
- Switches on the ***Hans Hass Deco-Brain*** under water so that the unit cannot store the ambient air pressure value required for calculating the actual water depth and the decompression plan.

The dive computer then operates solely as a precision depth gauge (display no. 2), dive timer (display 1) and indicates the maximum depth (display no. 3). Displays 4 and 5 for decompression conditions are extinguished. The diver may now dive according to his own estimates, if he is still able – and may make emergency decisions on the basis of information supplied by the **Deco-Brain.**

The «Out-of-range» mode of the Deco-Brain can only be cancelled at the surface by switching the unit off and on. In the «Out-of-range» mode, the dive time (display no. 1) and the maximum depth (display no. 3) remain indicated. An injured diver drifting on the surface whose Deco-Brain is in the «Out-of-range» mode may still be saved on the basis of information (max. dive depth and total dive time) stored and supplied by the **Deco-Brain.**

9 Self-diagnosis

The **Deco-Brain** monitors the dive as well as its own functional integrity.

Displays nos. 1–5 blink in a 0.5 second intervals if battery power is only sufficient for a 3–4 hour operating period.

In the unlikely event the **Deco-Brain** malfunctions, an *E (Error)* is automatically displayed in display no. 1. *In all probability, however, this situation will not occur, but if it does, the diver can rest assured the Deco-Brain will never display a wrong value and that in keeping with diving's first commandment, «Never Dive Alone» the diver will at the very least, be accompanied by a second dive computer.*

decompression dives as shown by the preceding diagram:

Repetitive dives

During our test, up to four repetitive dives were made. For safety and convenience, two dives were made in a lake, and the remaining two dives the **Deco-Brain** «dived» alone in a decompression chamber.
Since the dive computer is highly beneficial precisely in the area of repetitive dives (e.g. diver training, etc.), special importance was placed on display accuracy for several repetitive dives.
Even in this case, displayed values coincided with astounding accuracy to the tables.
I especially appreciated the ascent time display which provides the diver with a reading of the residual dwell time under water. In this manner, the diver can ascertain how long he wishes to or must survive the cold. I am convinced that this display is a major contribution toward improved diving safety since false decisions based on time-dependent factors such as air consumption, coldness, etc. can be prevented.

Diving in mountain lakes

Our test program also included diving in mountain lakes and all attendant subtilities such as change of elevation, repetitive dives, etc.
We purposely selected a mountain lake whose elevation of 1542 meters (5100 ft) above sea level made it a border line case in terms of the dive tables. However, due to a high pressure zone, the ambient air pressure corresponded to a elevation approximately 200 meters (600 ft) lower, whereby the computer correctly calculated a decompression plan according to the table for a lower elevation.

We were pleased with the performance of the instrument in this test; during the drive back home, we observed the readings and expected an increase of the descent time as we crossed the table elevation limit. It did not surprise us that this occurred precisely at the corresponding elevation, given the prevailing weather conditions.
After a number of dives in different mountain lakes, our enthusiasm continued to grow for the dive computer.

What are the operating limits of the Deco-Brain?

Item 8 in the brief description of technical specifications gives a list of conditions outside the operating range of the **Deco-Brain** which are acknowledged by an «Out-of-Range» display.

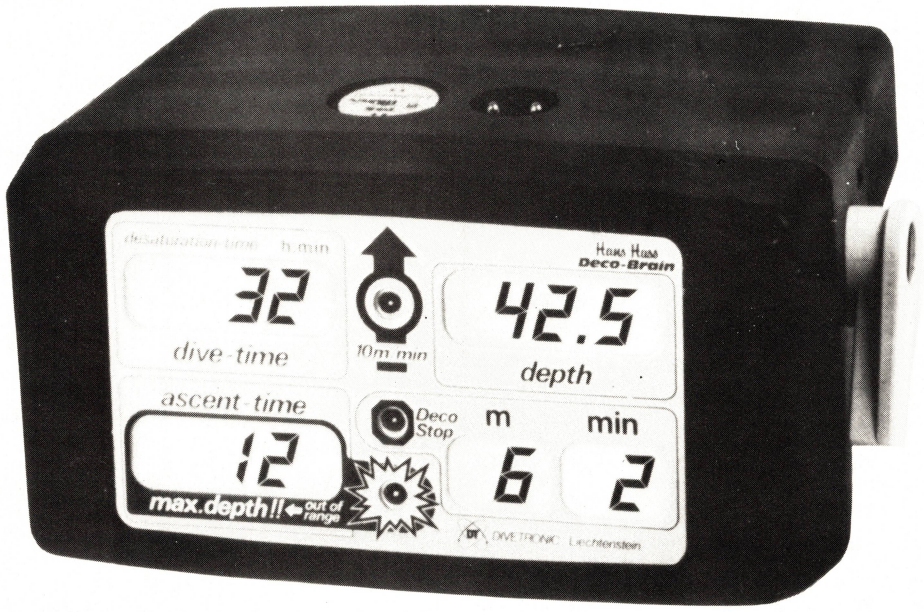
Displays/ power consumption

The **Deco-Brain** is provided with LCD displays due to lower power consumption and better readability under high power light sources. Even in the event of a lamp failure, safe ascent is assured.

The proper ascent rate is indicated by blinking of the ascent rate LED. If the decompression LED display also illuminates, the diver need only remain at the respective depth until it distinguishes. The diver then knows when he may return to the surface. Rechargeable batteries ensure an operating period of approximately 80 hours. The entire display starts blinking in 0.5 sec. intervals if battery power is only sufficient for a three to four hour operating period. However, the dive computer continues operation as usual. In addition, the **Deco-Brain** can be charged during calculation of a surface interval. Full charging requires 4 hours; the unit can be charged from 110/220 V AC or a car battery.

The LCD display can be easily read in the dim light of the depths. Reflections may occur through oblique light from the sun or a diving light.

After a little practice, however, the **Deco-Brain** can be read in any situation.



Housing

The housing of the *Hans Hass* Deco-Brain warrants for optimum operation of this revolutionary dive instrument:

The **Deco-Brain** can be fastened to the forearm or attached to the diver's BC. The high grade plastic housing is not only weather-resistant and saltwater-resistant, it also resists impacts and temperature shock and is waterproof to 9 bar (or a depth of 80 meters (262 ft).
The Deco-Brain has only one operating element or reed contact switch which may only be actuated by a «pulling and turning» movement. This feature together with streamlined housing design prevents accidental switch-off of the unit under water and ensures that the computer is switched on when it is fastened to the forearm on the surface.
The housing has no openings for cables or switches which could lead to leaks. The two-part plastic housing is sealed and consists of a self-contained electronics modul and a separate replaceable power pack.
Normally, the power pack need not be removed. Charging is accomplished via two gold-plated contacts which are exposed to the water when diving since they do not require any seals.
In short: A housing a diver would desire for a UW camera.

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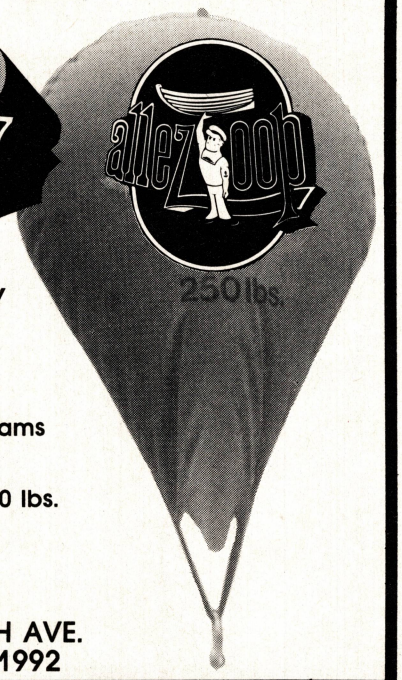


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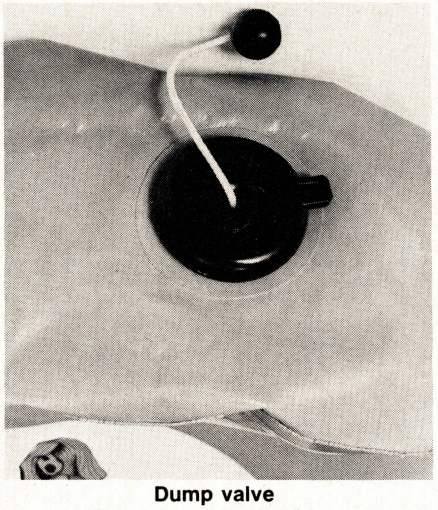
ALLEZ-OOP

(Continued from Page 11)

the bag) and welded to double thick patches on the bag. Included with the bag is a heavy duty shackle which attaches to the loop.

The AO-250 is teardrop shaped with the bottom open to facilitate adding air and to allow air to flow out as it expands on ascent. The operator, however, can maintain precise control of the amount of air in the bag, and thus the rate of ascent, through use of the dump valve at the top. The impact resistant, ABS plastic, spring loaded valve vents air when its attached cord is pulled.

Operation of the AO-250 is simple. Attach the bag to the object to be recovered, either by the shackle directly or by tying a line from the shackle to the object. Inflate the bag slightly and reposition it if necessary to balance the object correctly. Be sure nothing blocks the object's path to the surface and that other divers remain clear of the area throughout the lift. Make sure no lines hang loose from the object. Keep all your gear, hoses, etc. free of the lift. Slowly inflate the bag until the object just begins to rise. Remain above the object being lifted and maintain proper ascent rate using the dump valve. (Remember, the air in the bag will expand on ascent, and the bag will increase its rate of ascent if the extra air is not vented off.)



Dump valve

A point to remember is that this bag may be capable of raising objects which you're going to have a tough time lifting out of the water onto your boat, so be prepared with a hoist or a few strong arms if you're after monster wreckage.

Care of the bag includes rinsing with fresh water after use (especially the dump valve) and drying before storage.

The AO-250 lift bag can be a useful tool for the sport or commercial diver. It sells for $120. Allez-Oop also makes 500, 1000 and 2000 pound bags. Contact Allez-Oop, 283 Greenwich Avenue, Greenwich, Connecticut 06830; (203) 629-1992.

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Spanish Hogfish

A toothy character with a voracious appetite

TEXT AND PHOTOGRAPHY BY GERI MURPHY

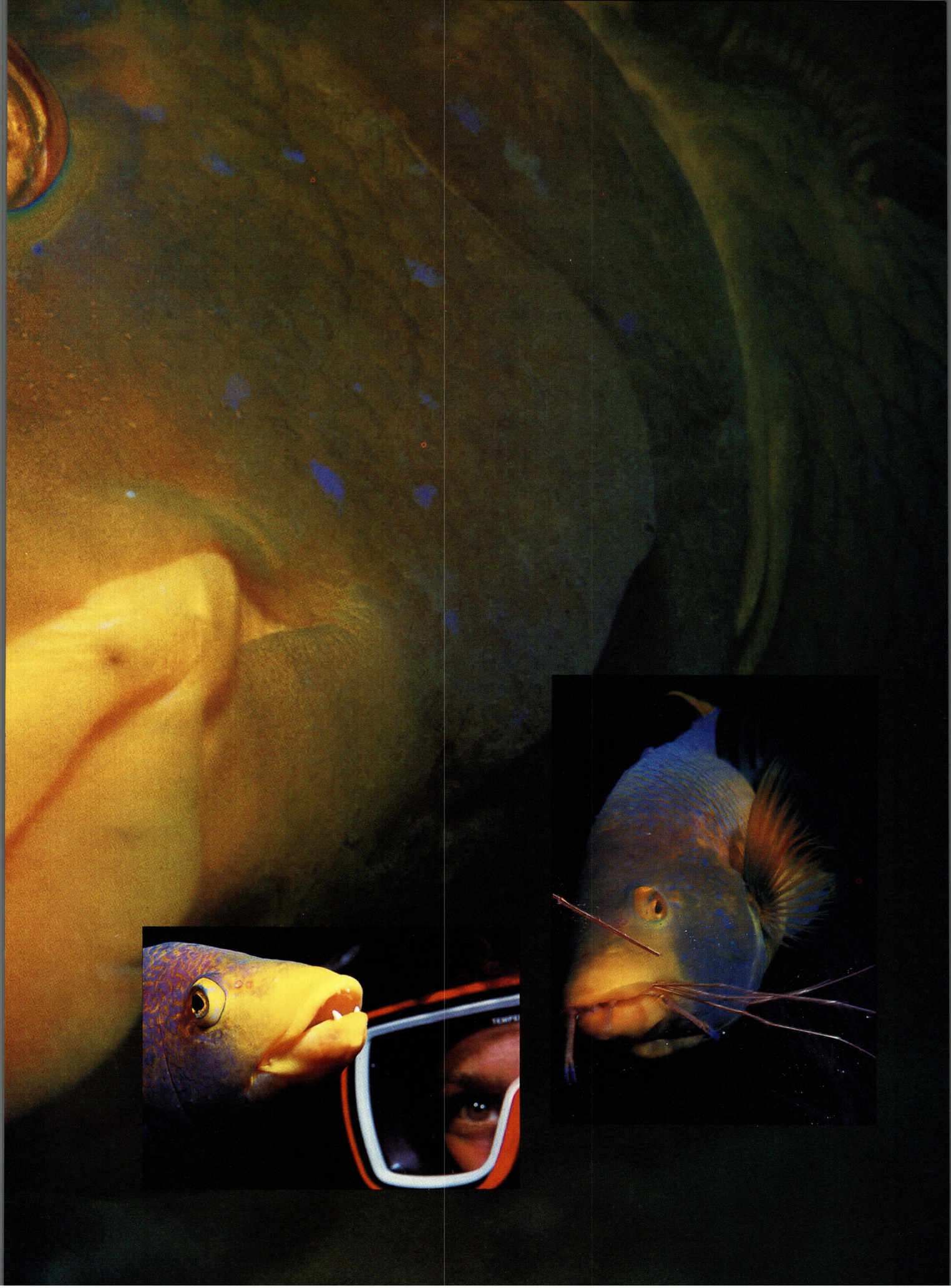
The Spanish hogfish (*Bodianus rufus*) is perhaps one of the most fascinating creatures of the Caribbean coral reef environment. It is a colorful character ideally suited for underwater photography. It possesses a remarkable appetite for gobbling up just about anything that crawls, hops or wiggles across the ocean floor. It can provide hours of entertainment for the diver as it goes about its daily business on the busy thoroughfares of the coral jungle.

The Spanish hogfish is a member of the wrasse family, a whole tribe of fish species commonly found on most coral reefs in the Bahamas, Caribbean and off the coast of Florida. You will generally find them in the shallow to medium depth zones ranging from 10 to 80 feet. They seem to particularily like the 20 to 40 foot range where they can poke around the bottom hunting for small invertebrates such as crabs and clams.

Underwater photographers are particularly attracted to the Spanish hogfish because of its stunning color patterns. It is basically yellow, with the upper front portion a bluish-purple or slightly greenish cast. The face of this creature is especially interesting because of the peculiar arrangement of canine shaped front teeth which protrude from its mouth. It looks like the perfect candidate for a dental care ad.

This fish did not get the name hogfish by accident. Of all the fish on the coral reef, the Spanish hogfish appears to be the most voracious eater with the most indiscriminate appetite. For openers, it loves sea urchins and will begin to feed with the slightest encouragement. If you do not have a knife for chopping sea urchins, an alternate choice is brittle starfish. Simply roll over a couple of rocks or dead coral chunks and the eager Spanish hogfish will zoom in to snap up the brittle starfish as they scramble across the bottom in search of cover. The Spanish hogfish also loves arrowcrabs, file shells, worms of all types, small coral crabs and baby lobsters. Its gluttonous dining habits far override its fear of divers and the hogfish is an excellent model for the photographer's lens.



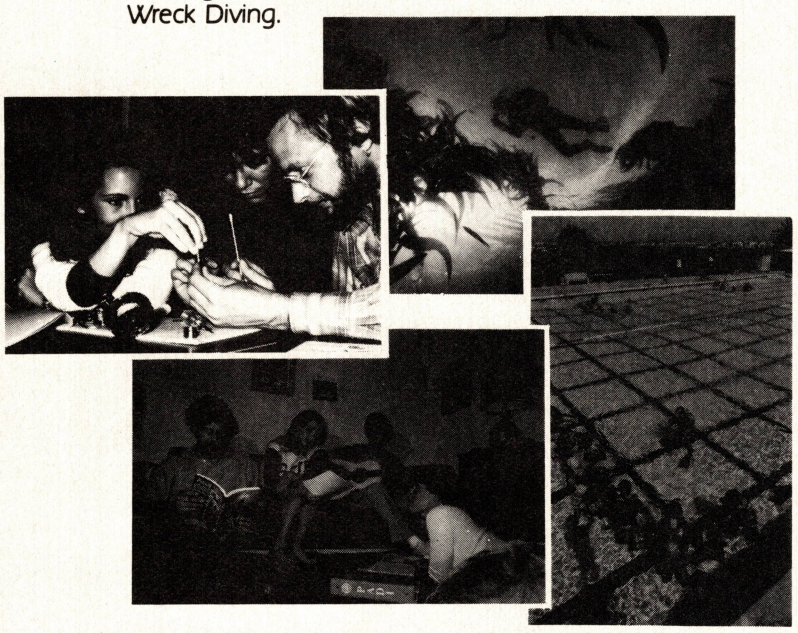


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Rx FOR DIVERS

(Continued from Page 34)

other pleasantries associated with a vacation to a tropical island or a day at the ocean and it is the consensus of most dive medicine experts that all dive activity should be stopped as soon as a woman thinks that she might be pregnant and that no diving be done for the duration of the pregnancy.

Since many women will not have any indication that they are pregnant until six to eight weeks into the pregnancy, or even longer in some cases, it is advisable that sexually active women divers or their partners utilize a reliable means of contraception. Similarly, women who are trying to get pregnant should stop scuba diving before attempting to get pregnant. However, if an unplanned pregnancy does occur there is no reason at this time to recommend having an abortion just because diving was done after the beginning of the pregnancy.

And for the inveterate divers who cannot wait for studies to delineate whether diving during pregnancy is safe or not, it is recommended that these women limit their dives to less than 30 feet of water; avoid repetitive dives, rough water, or getting chilled or unduly fatigued; not dive when size becomes a problem (usually after the sixth month); and otherwise dive very cautiously and conservatively.

WRECK FACTS

(Continued from Page 6)

gaseki, Chiyoda-Ku, Tokyo, Japan. I took the liberty of calling the Japanese Embassy for you and obtained the address of the Japanese Coast Guard in Tokyo. I wrote to the commander there and will forward his letter to you if he responds. Since one of those wrecks is a German vessel, Mike, I think you should try the German war museum: Deutsches Schittahrts Museum, D-2850 Bremer Haven, West Germany.

Alan Nutes, Hewitt, New Jersey, is conducting research on shipwrecks that occurred off the coast of New Jersey during the 18th century. But Alan has encountered several snags along the way and needs information on the *Ellis*, 1775 and the *Live Oak*, 1769. *Shipwrecks off the New Jersey Coast*, by Walter and Richard Krottee, lists the *Ellis* as wrecked on the south end of Brigantine Shoals, 1775, carrying a cargo of tea and large quantities of silver plate. The vessel was bound for New York from Liverpool. Her coordinates are: 39-23-30-N, 74-19-00-W. The only *Live Oak* I could locate, Alan, is from a book by Bob Marx, *Shipwrecks of the Western Hemisphere*, in which he lists a *Live Oak* sunk in 1780 on Black River. I know this is not the ship you seek,

(Continued on Page 74)

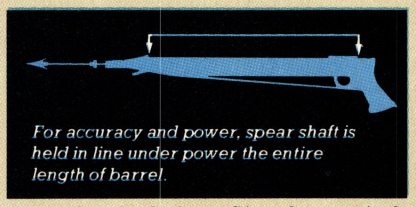


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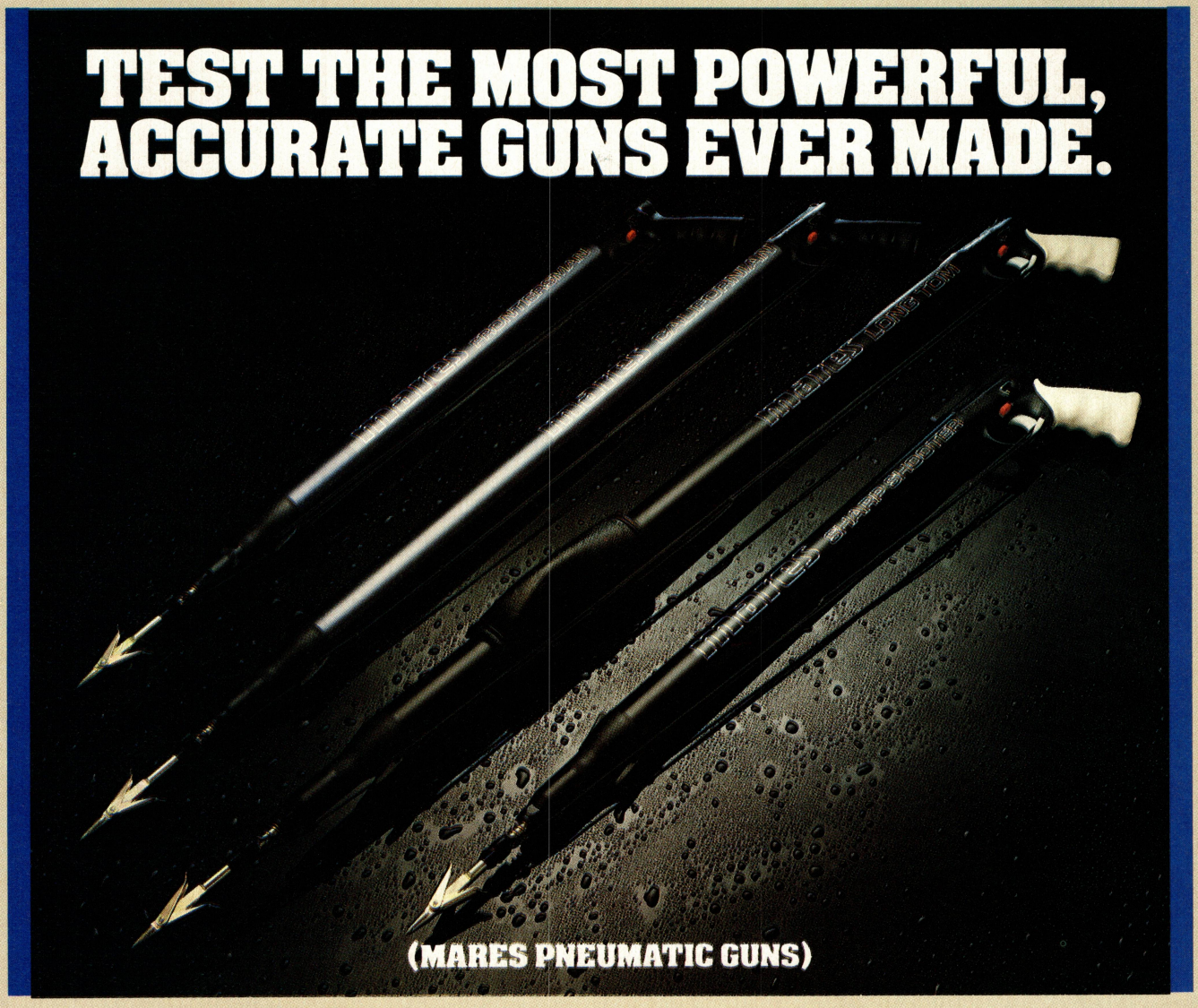
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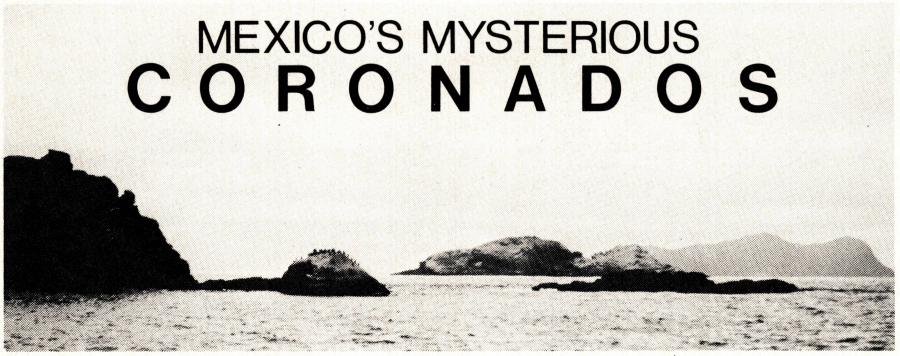
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MEXICO'S MYSTERIOUS CORONADOS



BY ALLYSON MADSEN

photo/J.P. Yeager

Islas los Coronados, the mysterious islands off Baja California, are the perfect setting for a "great escape" weekend or day-long visit. The sunsets are magnificent, the spearfishing superb and a colony of seals barks its welcome to the islands which are rich with ocean life and extraordinary legends. In recent years, divers have accepted the challenge of exploring these waters and have discovered some of the best kelp diving the Pacific coastline has to offer.

Fourteen miles south of San Diego and seven miles due west of Baja, the four Coronados Islands lie in Mexican waters and are surrounded by dramatically varied underwater vistas ranging from forests of kelp to craggy rock ledges and sand bottoms covered with sea grasses.

The largest island of the Coronados is also the one with the most intriguing history. South Coronado was the home of the legendary pirate, Jose Arvaez, who is said to have accumulated a great fortune from ships traveling south from San Francisco laden with gold mined from the streams of the Sacramento. Betrayed by one of his own men, Arvaez was killed and robbed of his riches by a group of fishermen from San Diego who divided his fortune among themselves.

The history of the Coronados is only matched by the unusual diving the islands have to offer. The north shore of South Coronado is marked by a group of rocks which extend northwest. This dive site is one of the richest in sea life of the Coronados. An endless variety of fish including the bright orange garibaldi, sea bass, red snapper, sheephead, halibut and yellowtail feed in the thick kelp beds here, while seals will often play games of hide and seek. Occasionally a bat ray can be spotted hiding in the sand and lobsters are sometimes found in the rocks which extend from the island.

On the east side of South Coronado, which stretches north and south for one and three-fourths miles, is Smugglers Cove and the Old Hotel. An infamous spot in the history of the islands, Smugglers Cove was the location used to replicate Pitcairn Island in the original *Mutiny on the Bounty* The cove first earned its name when it was discovered as the way station for a ring of smugglers sneaking Chinese into California. Later, during Prohibition days, the Cove was a rendezvous point for rum runners.

Although the waters of Smugglers Cove are murky and the sand bottom provides little of interest, the dilapidated Old Hotel is an interesting historical landmark. Built in 1930, during Prohibition, the Coronado Islands Yacht Club was established by two San Diego businessmen as a gambling casino, cabaret and cafe. It became the favorite escape for many of San Diego's elite who were looking for a shot of rum and a turn at the tables.

South of the Old Hotel and Smugglers Cove is the most outstanding kelp diving to be found around the islands. Thick forests of kelp line the southeastern shores where depths begin at 20 feet, gradually sloping to 85 feet, several hundred yards from the island.

An infinite variety of underwater scenes can be found every few feet at the south end of the island. Around the southern point the kelp beds become thicker and game fish abound. The orange garibaldi is the most friendly of these and will often swim directly up to a diver's facemask for a close inspection. Huge spider crabs can be seen lumbering through the sand and rocks, eels are often hiding in the holes in the rocks and brightly colored anemones cling to the ledges.

The sand bottoms are generally covered with shells of all types, with green and brown sea cucumbers scattered throughout. It is common to see bat rays buried in the sand, but their sharp senses send them in flight when divers get near.

Eighty-five Foot Reef is a must for the more advanced divers of the Coronados. Three-quarters of a mile east of the south end of South Coronado, it is a tricky site to locate. The pinnacle of the reef comes up to a height of 65 feet from the sandy bottom which is 85 feet deep.

This location provides by far the best spearfishing on the islands—big game fish are plentiful. Colorful orange and brown anemones and starfish make this an excellent photography site. The only drawback to the area is a strong current, common at the reef, so caution is a must.

Two small islands between North and South Coronado provide some unique dive sites. Middle Rock is best known for its rock ledges which extend south and east from the small island through the slot between Middle Rock and Middle Island. A treacherous anchorage, the area has been nicknamed Anchor Heaven because the ledges are filled with abandoned anchors.

Sea Lion Cove is on Middle Coronado and here a colony of harbor seals basks in the sun. These curious animals are often willing to play with divers and will always make an exploratory swim to investigate newcomers. The sand bottom in this area averages 30 feet with plenty of sea grass and kelp but a scarcity of fish.

North Coronado is said to be the oldest of the islands, 40 million years older than its neighbors, all of which are sedimentary rather than volcanic. It is the most exposed of the islands, with its weather side facing out to open ocean.

On calm days, diving the west side of the island is possible. An early morning dive is recommended for the best weather conditions. Near the shore depths are 20 feet but dramatically drop off to 100 feet just 50 yards offshore.

These waters teem with game fish including sea bass, yellowtail, halibut, sheephead and others. Some of the largest fish of the Coronados have been sighted in these waters. A breeding colony of sea lions inhabits this area.

On the lee side of the island is a favorite spot for beginning divers. Named the Lobster Shack for the rickety structure which still stands on the island, this dive site is shallow with depths from 30 to 50 feet and a gradually sloping rock wall.

The south point of North Coronado offers a challenge to the more advanced diver. The island narrows to an isthmus which is connected to the main island by a rock arch. North of the arch is a sand and rock shelf with an average depth of 50 feet while south of the arch is a dramatic cliff, dropping to 110 feet. A rock overhang about halfway down the cliff is covered with magnificently colored red and yellow anemones. Strong currents and heavy surge near the arch make this a difficult dive, not to be attempted in bad weather conditions. But in calm weather, this is one of the most memorable dives of the Coronados.

The rule of thumb for spearfishing in the Coronados is "ten fish a day, any kind, any size." All shellfish are off limits. A Mexican fishing license is required and can be obtained free at a number of fishing and diving shops in San Diego. There are some specific regulations about certain species of fish which should be explained when you pick up a license. For more detailed information about spearfishing in Mexico, write Officina de Pesca, 395 West 6th Street, Suite 3, San Pedro, CA 90731.

A fleet of dive boats makes day-long and weekend trips to the Coronados Islands from San Diego on a regular basis. Individuals can select from a number of charters arranged through the local dive shops. The major shops in the area are New England Divers Supply, Diving Locker, San Diego Divers Supply and Ocean Enterprises.

Florida Keys

SDM SPECIAL SUPPLEMENT



Florida Keys

AMERICA'S ISLANDS IN THE SUN

TEXT AND PHOTOGRAPHY BY STEPHEN FRINK

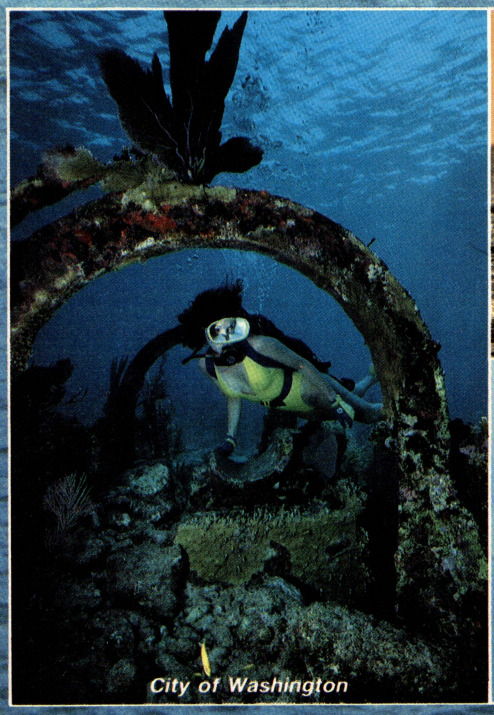
I suppose I could be accused of bias in extolling the virtues of the Florida Keys. I've lived in those balmy climes for over five years now and while my work takes me to many beautiful and perhaps more exotic dive destinations, it is always with a sense of appreciation that I return home. For the Florida Keys comprise a unique environment with an appealing blend of magnificent offshore coral reefs and superb topside support industries for the tourist and resident alike.

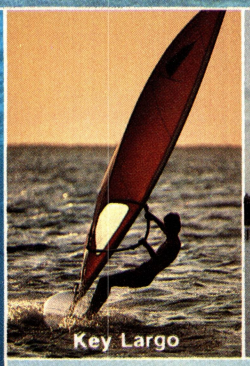
The general geography of the Florida Keys is different than you are likely to find elsewhere in the world. On approximately the same latitude as Nassau, Bahamas, the Florida Keys enjoy very mild winters and the same warm waters year-round that you might expect of the Caribbean Islands. Most coral cannot flourish in waters below 68°F. Thus, all it takes is a quick snorkel tour offshore to view the massive concentrations of living coral to be assured that the water temperature is certainly above that level. In fact, water temperature ranges from a low of 70°F during the winter months to the mid 80s during the summer. The visibility in these waters may also be quite variable, from 20 to 30 feet on a bad day to in excess of 100 feet on a very good day. As is the case throughout the Caribbean, the best and most consistently favorable water conditions may be found in the late spring though early fall, although the winter may bring days of remarkable water clarity.

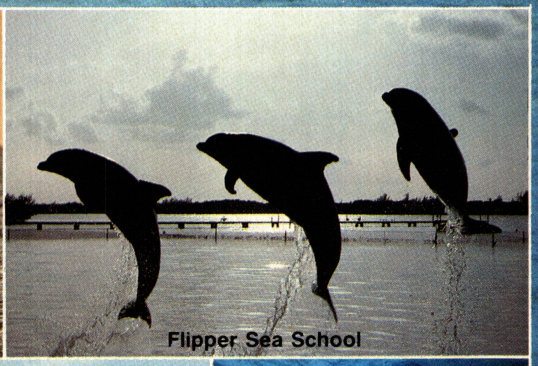
The Florida Keys are at the southern tip of the Florida peninsula and consist of a string of over 200 islands of various size.

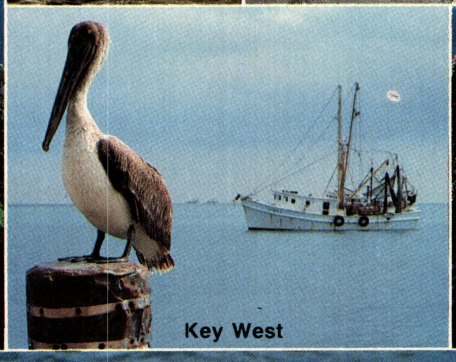


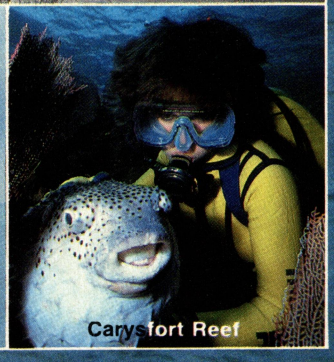
Sand Key


City of Washington


Key Largo


Flipper Sea School


Key West


Carysfort Reef

Florida Keys

There are perhaps 50 islands which support the majority of the population in the Keys and these are connected by U.S. 1. It is of historical interest to note that the idea of connecting these islands to the mainland evolved not in response to the needs of the automobile, but because of the railroad. Henry Flagler funded the initial system of bridges and causeways connecting the Keys in order to bring the railroad to Key West. His famous "railroad that went to sea" was a casualty of a hurricane in 1935, but much of the roadbed and bridge structure survived and was resurrected as the main automobile artery for the Florida Keys, U.S.1.

In the past year significant improvements have been made to the highway, especially to the bridges. One of the engineering wonders of the world has been the seven mile bridge. However, it was always a bit unnerving to be over three miles from land on a narrow, two-lane concrete ribbon as an 18 wheeler barreled down the highway in the opposite lane. I know as I pondered trips to Key West, the thought of having to cross the seven mile bridge was always a little intimidating. With the construction of a magnificent new bridge to span that stretch, such consternation is no longer valid. The bridge is two lanes in each direction now, so there is room to pass or pull off for repairs. Now it is quite pleasureable to drive from Key Largo to Key West as a result of this and many other highway improvements of recent vintage.

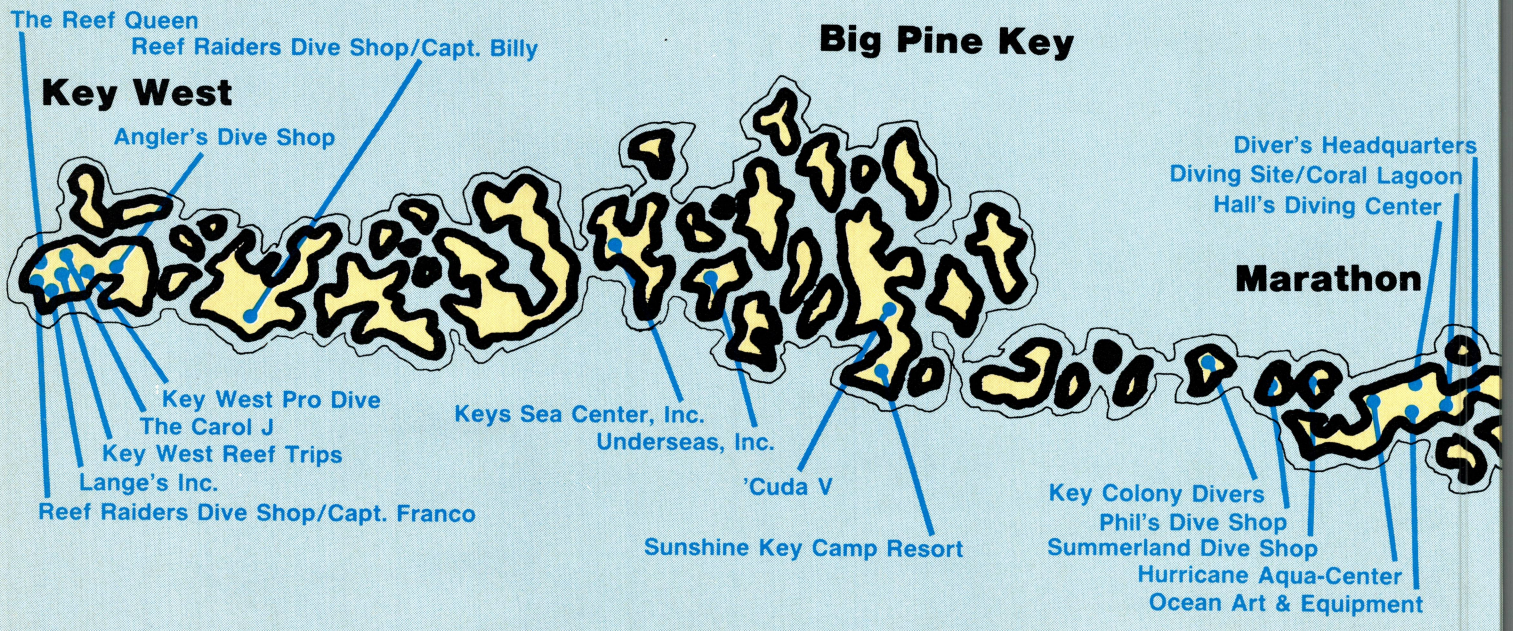
In speaking of the drive from Key Largo to Key West it is appropriate to discuss the mile marker system. Much of the commerce in the Florida Keys is on Highway 1, and while most highways utilize mile markers, rarely are they as useful as in the Keys. Mile Marker # 1 is in Key West at the southernmost tip of the Overseas Highway and the numbers increase as you travel toward Miami. Marathon, for example is around Mile Marker 50 and Key Largo is in the neighborhood of Mile Marker 100. Most businesses include their mile marker number in their advertisements or brochures, so if the business is located on the highway, it should always be easy to find.

In the past few years there have been other changes gradually occurring in the Keys, and most of these have been di-

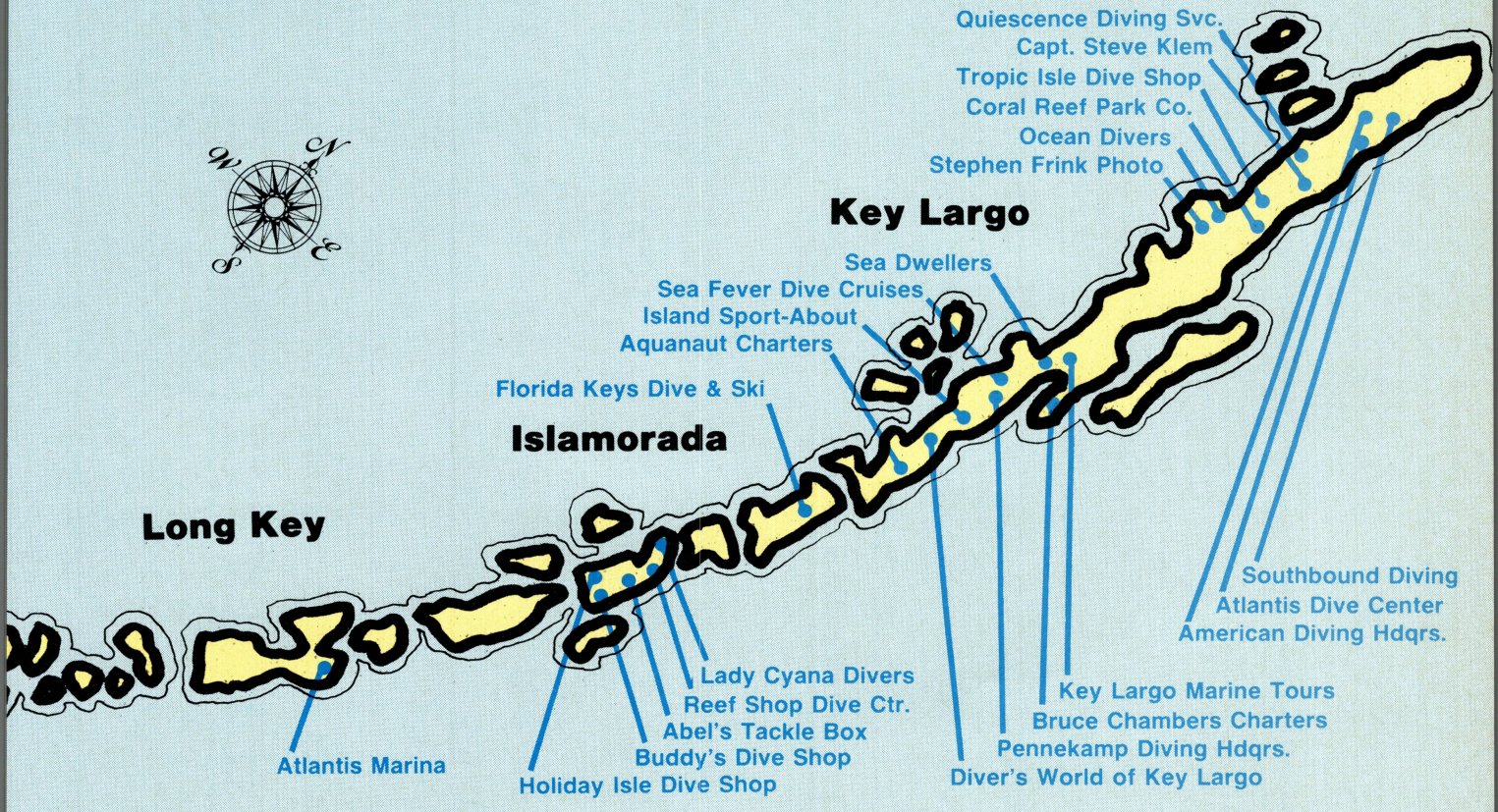




Upper right: Canoeing in mangroves at Pennekamp Park. Right: An aerial view of U.S. 1, the Overseas Highway. The route stretches from Miami down to Key West.






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Florida Keys

rected to providing better tourist services. The Keys acknowledge the role the tourist plays in their economy and realize the necessity to both attract and retain visitors. For example, there is a new pipeline supplying fresh water to the Upper Keys so that the water shortages and lack of water pressure, formerly an aggravation, no longer are troublesome. There are more hotels, condominiums, resorts and interval ownership units on the islands than there were a few years ago. This means that at peak periods, there is greater probability of finding suitable accommodations and also means that there is greater variety available at all times.

Accommodations will run from opulent to austere and be priced accordingly. One fairly recent trend in the hospitality industry in the Keys involves the dive/lodging package. Even though the coral reef structure has traditionally been a strong drawing power for divers from all over the world, often the hotelier ignored this in his promotions. Now we are seeing the more progressive dive shops working in cooperation with the better hotels to create dive packages. This means greater convenience and price savings to the traveling diver since the package price will always be lower than the *a la carte* prices for the diving and hotel room.

Of course, a person need not stay in a hotel to enjoy Keys diving. There are a number of clean, comfortable campgrounds offering a wide variety of amenities including boat ramps, showers, swimming pools and even some hot tubs. There are weekly and seasonal rentals on

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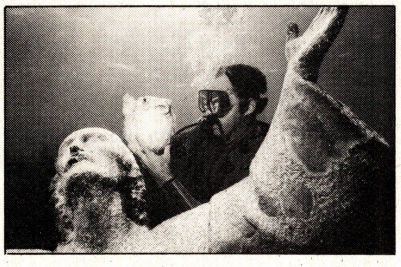
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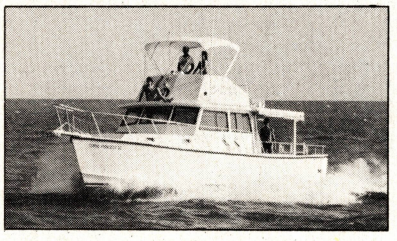
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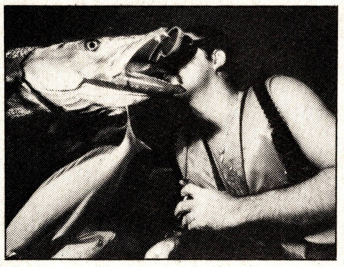


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Florida Keys

condominiums and several of the interval ownership developments have instituted lodging packages catering to the diver. Your best bet to resolve any lodging questions is to call or write one of the Florida Keys pro dive shops before your departure to research which housing options might be available in their community and the relative costs of each.

Another area of local pride is the number of high quality restaurants scattered throughout the Florida Keys. A recent issue of The Florida Keys Magazine was devoted almost exclusively to descriptions of the fine dining available and concluded that the Keys have, "more good restaurants per capita than any spot on earth, with the diversity and quality normally found only in major cities. From Key Largo to Key West one finds suprises and delights at almost every turn. And since the Keys are right in the middle of one of the richest seafood harvesting grounds in the world, our local cooks have invented some of the most tantalizing seafood dishes imaginable." I've personally sampled a fair percentage of the varied cuisine available and found the quality to be consistently high and reasonably priced. Here again your dive shop will be happy to assist you in recommending restaurants appropriate for your particular palate and budget.

Unlike some of the more remote dive destinations, entertainment in the Florida Keys does not die when the boat returns to the docks. There are night clubs and bars, live theater, movie houses and live music ranging from jazz to rock and roll to calypso. The sunset over the mangroves is often the best show in town, but for those wishing to sample the local nightlife, it is abundant in great variety.

There are other advantages relative to a Florida Keys dive vacation. Obviously, like the promotional slogan says, these are "the islands you can drive to." And because you can have your car with you, you can carry more scuba gear without fear of overweight charges and you can carpool to further reduce costs. The currency does not require conversion factors, no passports are required, and the electrical service is all 110 volts. This is still in the United States, although on April 23, 1982, it became a country within a country, the "Conch Republic."

It was a mock secession in protest of a U.S. Border Patrol roadblock in Florida City that created a 19 mile traffic jam and an irate business community. Fearing the tourist based economy would be threatened, Key West declared itself an independent republic, declared war on the United States and then immediately surrendered and asked for $1 billion in foreign aid. The Miami Herald called it a "public relations coup" and today the

check point is only a memory. It is perhaps more symbolic of the independent nature of so many of the Keys residents and even though still technically the United States, the Florida Keys have always retained their own distinct identity.

As interesting as the topside amenities might be, it is the quality of the diving and professionalism of the dive operators that keep the traffic returning to the Florida Keys year after year. No matter where you might choose to dive in the Keys certain factors will remain constant. The water will be relatively warm and clear, more so in the summer than the winter, of course. There will be healthy fish populations, and in some places absolutely massive concentrations. The dive operations will feature good boats and rental gear in excellent working condition. And virtually all diving will have to be done from a boat, whether a private or commercial craft.

One of the most often asked questions of any dive shop in the Florida Keys is, "Where can I go for good diving just offshore?" The answer is an easy one, although not necessarily the one the diver was hoping to hear: nowhere. The Florida Keys enjoy a fringing reef structure, and while there may be isolated coral structures as near as two miles from shore, the bulk of the reef is four to six miles offshore. While this may seem a negative aspect to some, it is really a blessing. The reef is constantly bathed by the cleansing waters of the Gulf Stream, although the degree of effect from the currents is variable. Also, the water on the bayside is consistently more turbid than the waters oceanside and an intricate system of mangroves filters most of the dirty water before it reaches the reef. While the waters on the main coral reefs are certainly affected by winds and ocean currents, the fringing reef structure affords better water clarity than could be expected were the reefs just offshore.

Most of the commercial craft servicing the Keys are between 30 and 65 feet and are licensed to carry between 6 and 40 divers. The average Keys dive boat will

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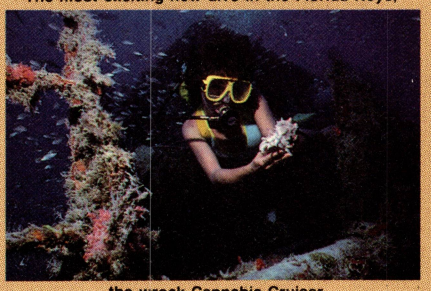
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Christ of the Abyss statue.



Baitfish, Key Largo.

Florida Keys

be equipped with dive platforms, tank racks, freshwater rinses, sundecks and pure oxygen for diver safety. Because these operators must comply with stringent U.S. Coast Guard guidelines to charter for hire, the diver can be assured of transport on a seaworthy vessel.

While not every dive shop in the Florida Keys is a member of the Keys Association of Diver Operators (KADO), the ma-

jority of shops do subscribe to KADO recommendations regarding diver safety. It is important for divers planning trips to the Keys to be aware of the new emphasis on the use of dive logs by the KADO member shops as an adjunct to the certification card. As of August 1, 1983 these shops will begin a concentrated effort to assure that their customers will use the logbook as a valid indicator of the experience level of the scuba diver. Because of the volume of new divers these shops host each year, they have recognized that logbooks will help them gauge the experience level of their customers. The certification card may show that the person has in fact taken a scuba course, but cannot demonstrate how often or how recently he/she has been diving. The logbook will fill that gap and hopefully lead to even higher levels of diver safety.

To get a collective overview of diving in the Florida Keys, one must consider that there are three distinct geographic subdivisions, each with its own special topside attractions and significantly different underwater allure. These are the Upper Keys, Middle Keys and Lower Keys.

Upper Keys

The Upper Keys include Key Largo, Tavernier and Islamorada, primarily, and the Key's heaviest concentration of dive shops is found in this area. In addition, a very fine dive shop serves the residents of the Ocean Reef Club in North Key Largo. Together, these shops can provide diver transport to an incredibly broad range of coral reef. The preeminent dive destination for the Florida Keys is **John Pennekamp Coral Reef State Park** located in Key Largo.

The story of the park is a familiar one to divers. Established in December of 1959, the waters from the shoreline to three miles offshore are protected by state jurisdiction, and the waters from the three mile limit to the edge of the continental shelf are protected by federal statute. Since it is a marine preserve, spearfishing and coral collection are absolutely illegal within the park confines. However, lobster may be taken during the season so long as they are of legal size, and line fishing is permitted. The park contains over 100 square miles of protected waters and within its boundaries flourish some of America's finest coral reefs.

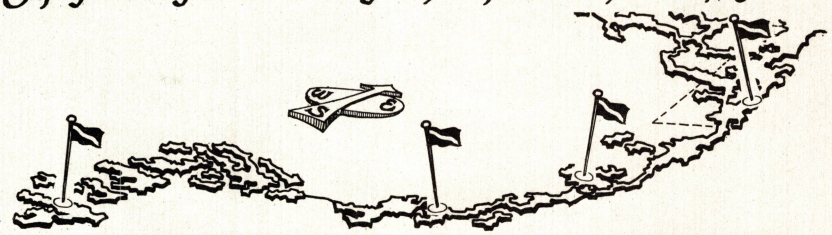
At the northern end of the park, and marked by a 125 foot steel tower, is **Carysfort Reef**. Carysfort is quite a distance to run for most of the dive operators and as a result hasn't been dived as heavily. Great stands of elkhorn and staghorn coral are spread throughout the shallow areas of the reef and there are interesting barrel sponges to be found at the deep end of the reef. As is typical throughout the park, there are very healthy fish populations and they are easy for the photographer to approach.

The Elbow is further south, and is

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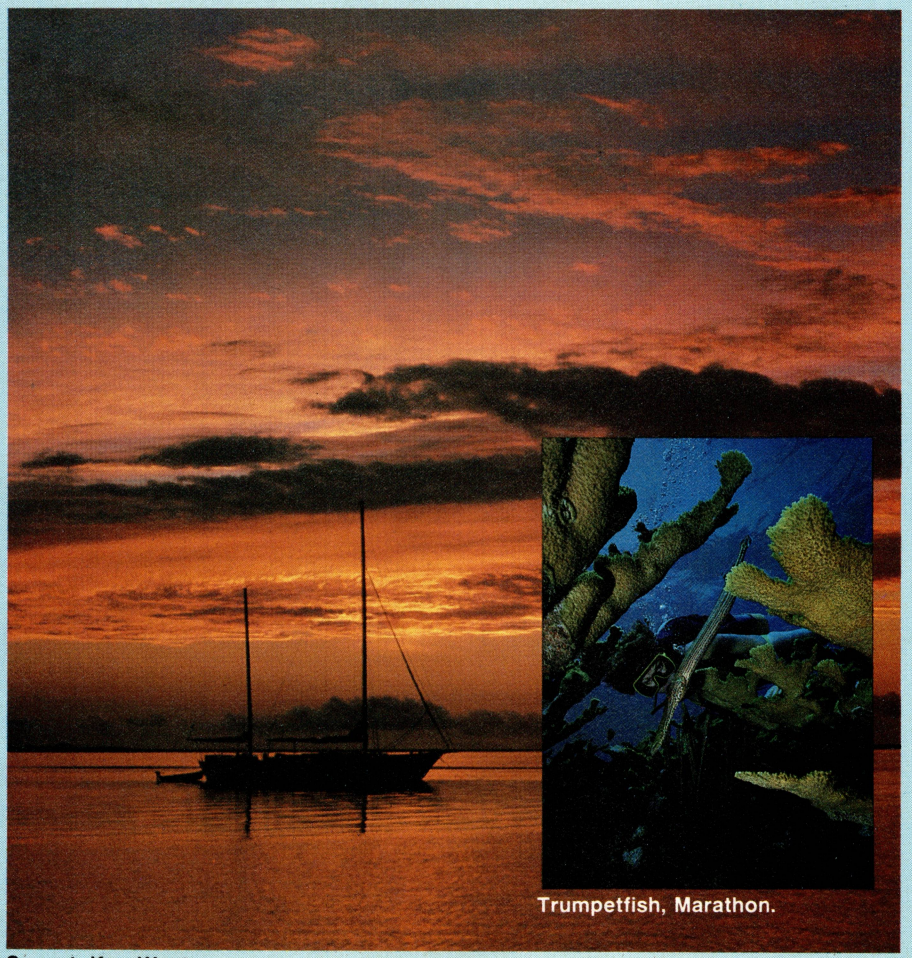
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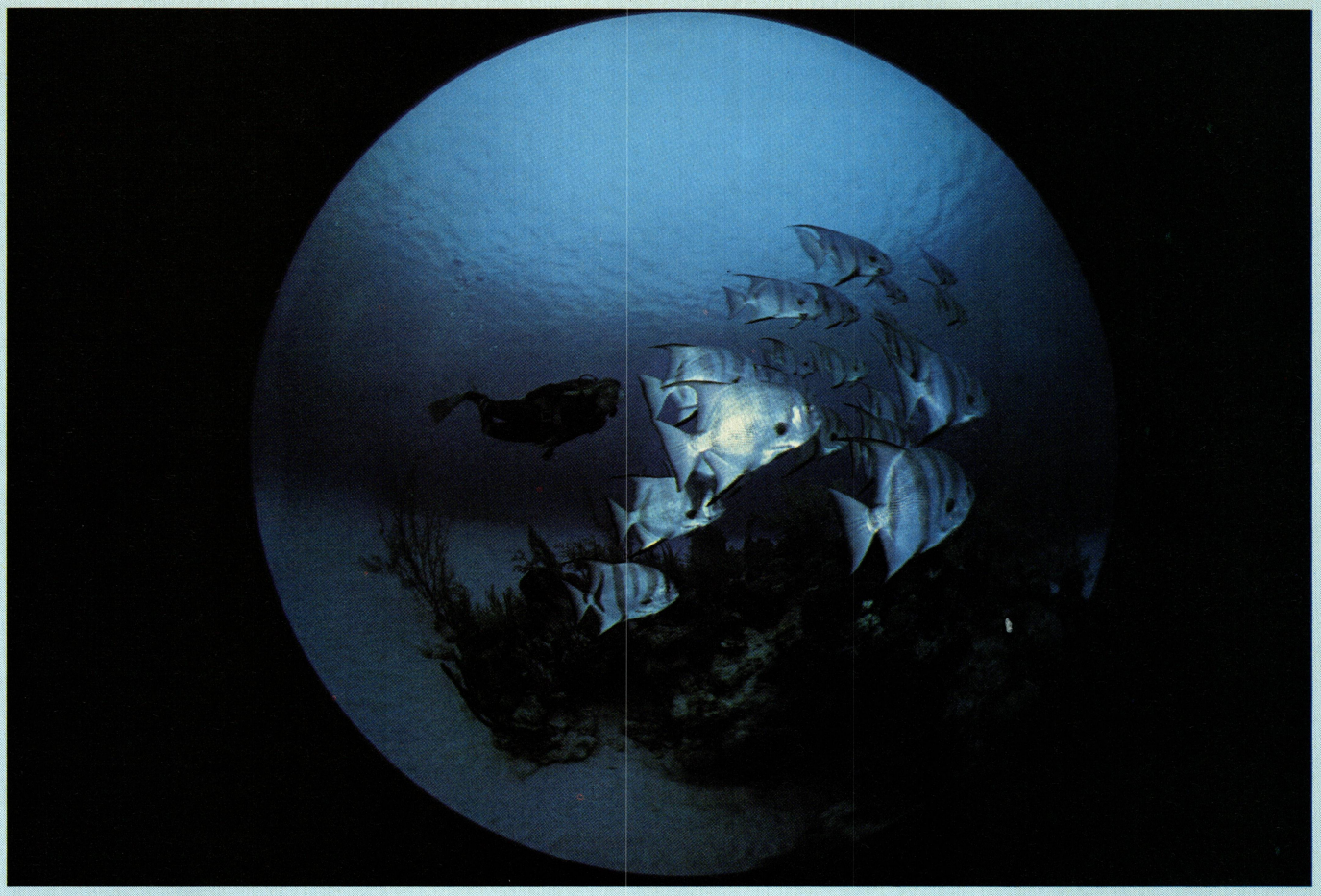


Diver and hermit crab, Looe Key.



Trumpetfish, Marathon.

Sunset, Key West.



Spadefish, Key West.

Florida Keys

named for the way the reef juts out toward the Gulf Stream. Most of the best reefs around the Elbow are shallow and the beauty, sublime. There are dramatic stands of elkhorn and high profile corals such as star and brain coral, but it is the more subtle details that best define the Elbow. The glass minnows which seasonally accumulate at the **Minnow Caves**, the moray eels which beg for handouts at the ***City of Washington*** wreck, the clouds of midnight parrotfish floating by to engulf one coral head after another... these are my memories of The Elbow.

To the south and inside The Elbow there is a picturesque reef structure accented by the statue of **Christ of the Abyss** sitting in 25 feet of water. The Christ statue is considered the symbol of Pennekamp Park and is an interesting photo prop. There is a semi-tame moray eel and a couple of friendly groupers inhabiting the corals around the statue, as well as some massive brain coral and one of the few stands of pillar coral to be found in the park. So even though the general visibility at the statue may not be as good as might be experienced on an outer reef, it is always a fascinating dive.

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perstructure was blasted away because she was a hazard to navigation, her hull and ribs provide refuge for all manner of schooling fish. The large schools of porkfish, spadefish and grunt at times nearly engulf the bow section and when the glass minnows are most evident, the *Benwood* can be one of the prettiest dives in the park. However, the *Benwood* is also inside the main reef areas and will experience fewer days of sparkling visibility as compared to an outer reef.

French Reef is more toward the southern end of the park and is characterized by large stands of high profile corals. The elkhorn formations are especially awesome, however it is the ledges, overhangs and swim-through caves which serve to give French Reef its identity. Often, and especially during the winter, these caves fill up with copper sweepers, making for exciting photo potential. One cautionary note however, these caves silt up quickly. So, if you intend to photograph inside, watch your buoyancy and try to be one of the first divers to swim through.

Molasses Reef is certainly the best known coral reef in the Florida Keys, and



Fish feeding, Islamorada.

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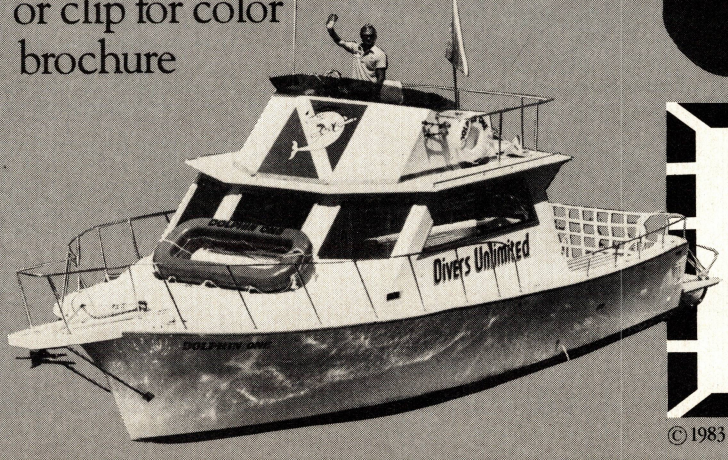


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Florida Keys

for many reasons one of my favorites. Molasses is marked by a 50 foot steel tower and is near the southeastern boundary of the park. Because of its proximity to the Gulf Stream, Molasses generally has some of the best visibility in the park and also some of the more interesting things to see. Masses of schooling fish, large concentrations of butterflyfish and angelfish and even schools of barracuda are sighted daily. The corals are generally high profile in a spur and groove configuration and exist in tremendous variety. In the midst of a natural sand amphitheater sits the windlass of an old sailing vessel, and elsewhere on the reef is a heavily encrusted Spanish anchor and a scenic coral window called the **Hole-in-the-Wall.** Whenever an assignment calls for fish photography, I head for Molasses Reef because I know the fish will exist in profusion and be easily approached. There is tremendous variety of quality diving to be found in the Upper Keys outside the park boundaries as well. The fish populations might not be quite as spectacular, but they are still healthy by Caribbean standards. And there are several very fine dive operations in the Tavernier and Islamorada areas to accommodate divers. **Pickles Reef** is a shallow reef with ample interesting macro subjects and extensive conch beds in the surrounding turtle grass. The **Conch Reef** and **Conch Reef Drop-off** are really quite spectacular under favorable conditions, but may be susceptible to strong currents. When that happens, the Conch Drop-off becomes a drift dive.

Davis Reef is one of the prime dives for operators in the Islamorada area and is characterized by prodigious fish populations. The coral structure is that of a patch reef with isolated areas of beautiful coral formations. Most of your typical Caribbean tropicals may be found on Davis Reef, but it is the massive schools of grunts and goatfish that remain my most vivid memory.

Many of the dive operations in the Islamorada area like to run a deep dive in the morning and finish up with a shallow dive in such areas as Davis, **Hens and Chickens** or **Alligator Light**. One of the better areas for the deep dives is **Crocker Reef,** where the bottom drops from 35 to 85 feet. The coral is of a spur and groove configuration with frequent color accents provided by barrel and encrusting sponges and seafans. New and exciting deep dives are also being developed regularly. The ***Cannabis Cruiser***, the wreck of a pot boat complete with intact bales of marijuana on board, is generating a lot of interest for the operators in Islamorada, as is another new dive, the **Three Peaks**. Also known as the Shark Pit, the Three Peaks, as the name sug-

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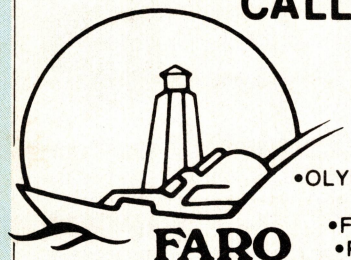
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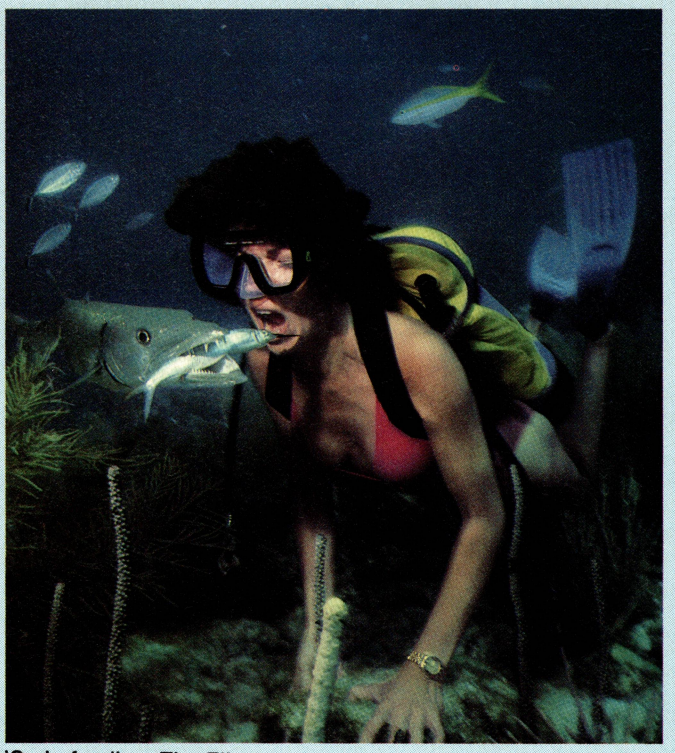
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'Cuda feeding, The Elbow.

Florida Keys

gests, is three massive coral congregates rising from the sand bottom at 90 feet to about 60 feet. While the coral is of interest, it is the fish life that makes this dive so exhilarating. There are a large number of big grouper, occasional schools of African pompano and plenty of sharks. In fact, while spearfishing is popular and practiced with regularity on dive trips in this area, the dive operators are hesitant to allow spearfishing on the Three Peaks for fear of bringing the sharks in. However, for photographers and just general excitement, this is a premium dive.

Middle Keys

Marathon is the major center of population in the Middle Keys and is served not only by U.S. 1, but also by a municipal airport with a 5000 foot runway. A number of private air charter companies work out of the Marathon airport, as well as two commercial airlines, Air Florida and PBA (Provincetown-Boston Air). Midway between Key Largo and Key West, Marathon has a very well-developed restaurant industry, as well as shopping and night clubs. As in the Upper Keys, lodging runs the gamut from motels to condominiums to campgrounds and some very attractive dive/lodging packages are available.

The dive shops serving the Middle Keys offer a wide range of services to their customers. Spearfishing, underwater photography, shell collecting, scuba instruction, scuba instructor instruction

and daily scuba and snorkel expeditions are all parts of the Mid-Keys bill of fare. In speaking with the different dive operators in the Marathon area it seems that a great deal of their business consists of people who keep coming back season after season. Of course they cater to the new diver as well; but Marathon seems a comforting place, the pace perhaps a little slower and more conducive to relaxation. Ultimately it is probably the easy access to good diving which becomes primary incentive for these yearly pilgrimages to the Marathon area.

There are numerous and diverse dive sites along the Middle Keys with depths ranging from 3 to 120 feet in areas regularly serviced by the commercial dive boats. Over 40 species of coral are indigenous to these waters, and the whole array of Caribbean reef life is in residence somewhere among this collection of coral heads. Some of the reef will be of the spur and groove type, some exists in patches, and some of the corals cover vast expanses—elkhorn coral as far as the eye can see. Some of the more popular specific dive sites follow.

Coffin's Patch is not one distinct reef, but actually six patch reefs. Each area seems to have a predominant coral type, but is not limited to that one type. For example, there is an impressive stand of pillar coral in one area, all the more noteworthy because of its relative rarity elsewhere in the Keys. Depths here range from 15 to 25 feet.

The reef system at **Delta Shoals** runs east to west and is rather narrow, but very rich in abundant sea life. Elkhorn coral is strongly represented throughout the reef and because the area is shallow, less than 25 feet to the sand bottom in most places, it is as appropriate for snorklers as it is for divers. Further offshore there exists a deeper, older reef which offers good diving in the 50 to 100 foot range.

Like Molasses Reef, **Sombrero** is marked by a large lighted tower, and because of the tower's visibility coupled with the excellent coral formations in its proximity, Sombrero is the Middle Keys' most heavily dived reef. There is a well-developed spur and groove coral system with winding sand channels leading seaward. In addition, the area features numerous ledges and overhangs alive with the typical denizens of the coral recesses such as spotted drums, bigeyes, squirrelfish, butterflyfish, and an occasional moray. Like Delta Shoals, Sombrero is shallow enough in most places to be attractive to both divers and snorkelers.

Most of the most interesting formations at **Yellow Rocks** are in 20 feet of water and feature a base of dead coral with vibrant living coral growing on top. There are respectable fish populations and there is good shelling in the surrounding grassy flats.

Mainly a sandy bottom with isolated coral heads, **Shark Harbor** is of primary



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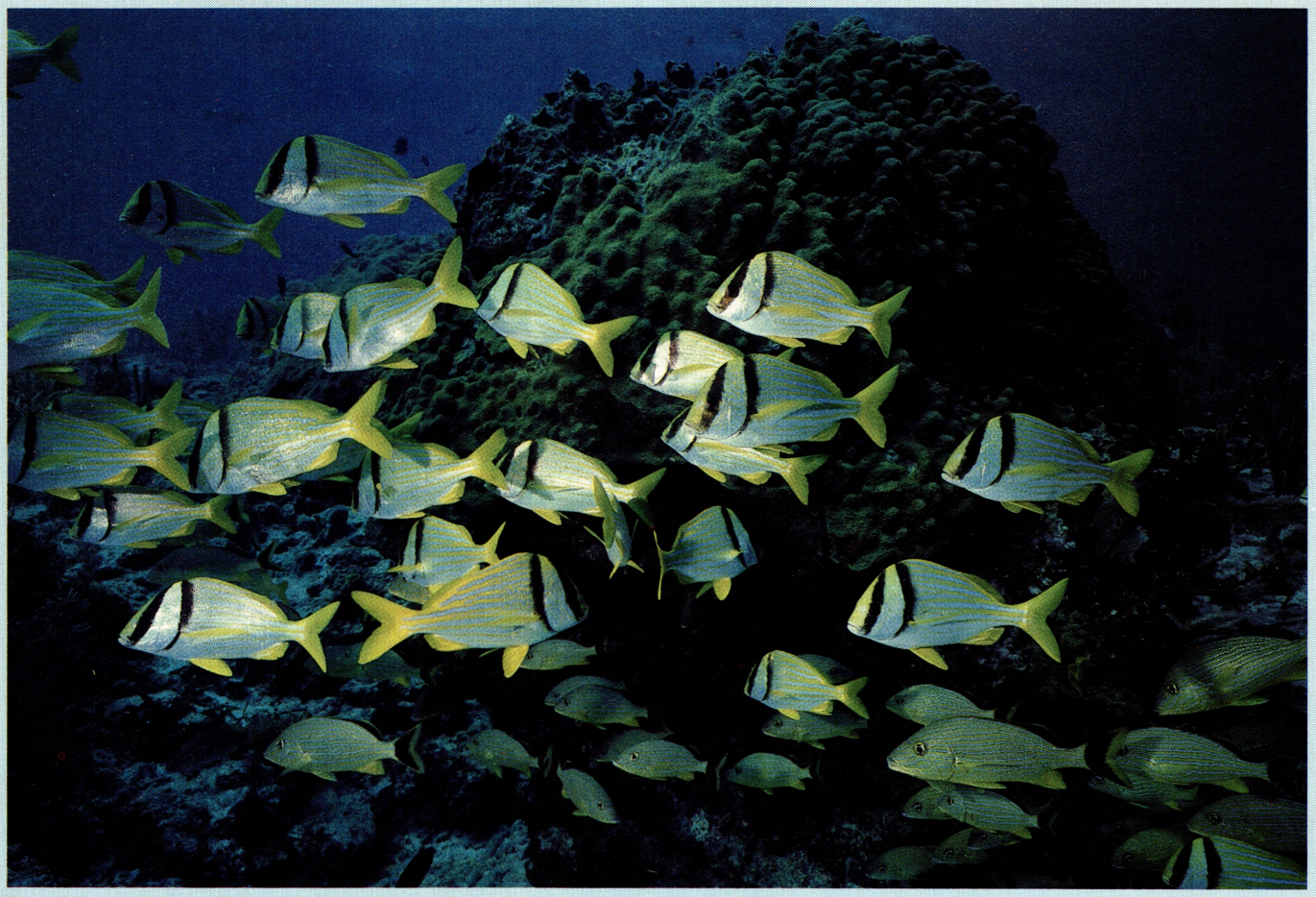
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interest owing to the frequent nurse shark sightings. The general depth is 25 feet.

In the opening of the article I alluded to the improvement to the seven mile bridge which made driving to the Lower Keys so much more pleasant. This new construction was at the expense of parts of the old span and these were intentionally dumped to create an artificial reef. In essence, there is a huge pile of trestle sitting upright at 120 feet and rising 25 to 30 feet off the ocean floor. Big grouper, jacks and jewfish are beginning to congregate and while the dive is a bit deep for daily charters, some of the dive operations use it to teach their advanced scuba students.

BIG PINE KEY

While generally considered collectively with the Middle Keys, I've chosen to isolate Big Pine Key since it has its own dive community, hotels, restaurants and night spots. In addition, the spots that the operators in Big Pine Key service on a daily basis are generally different than those served from Marathon. Looe Key, for example, might require an hour and one-half run from the Marathon area and even though most shops offer Looe Key excursions, none of them run there as regularly as do the shops in Big Pine Key.

For them it is only 30-40 minutes away.

Looe Key is our newest marine sanctuary. Named after a wrecked British frigate, the H.M.S. *Looe*, the land mass accompanying Looe Key was washed away by a hurricane over 150 years ago. What remains is one of the largest single coral reef structures in the Florida Keys at depths running from 2 to 100 feet. Most of the reef runs east to west with coral fingers jutting out north to south.

Because Looe Key was once an island there is some protection still afforded from heavy seas. There are perhaps 250 divable days per year on Looe Key and on any given day much can be seen. The main portion of the reef bottoms out in 30-35 feet, but there is an interesting 45 degree drop-off running from 65 to the sand bottom at 100 feet. Marine life on Looe Key has dramatically increased in the three years it has been protected as a sanctuary. Also evident in this time is a difference in fish behavior—now they are much easier to approach.

Of course, Looe Key is not the only good dive accessible from Big Pine Key. Each shop probably has another 20 patch reefs it frequents for one specific reason or another. For lobster, the **Honey Hole** might be one operator's favorite, or for spearfishing and shell collection, the **Munson Island Patches** might be considered appropriate. There is ample good and varied diving accessible with Big Pine Key as a base.

Lower Keys

KEY WEST

There are many sound reasons to make a dive trip to Key West. There is great night life, excellent shopping for clothes and souvenirs, superior restaurants and accommodations and reliable, professional dive operations. As in the Middle Keys, there are generally smaller groups aboard the boats which allow more diverse dive offerings. The total ambience of Key West makes it worth the trip with its bars, jazz clubs, galleries, museums, boutiques and Mallory Square sunsets. But, the dive operators of Key West are equally proud of their marine resource and do a fine job of sharing it with the public.

Key West dive sites offer an interesting blend of coral reef and wrecks. Some of the more prominant dive sites follow.

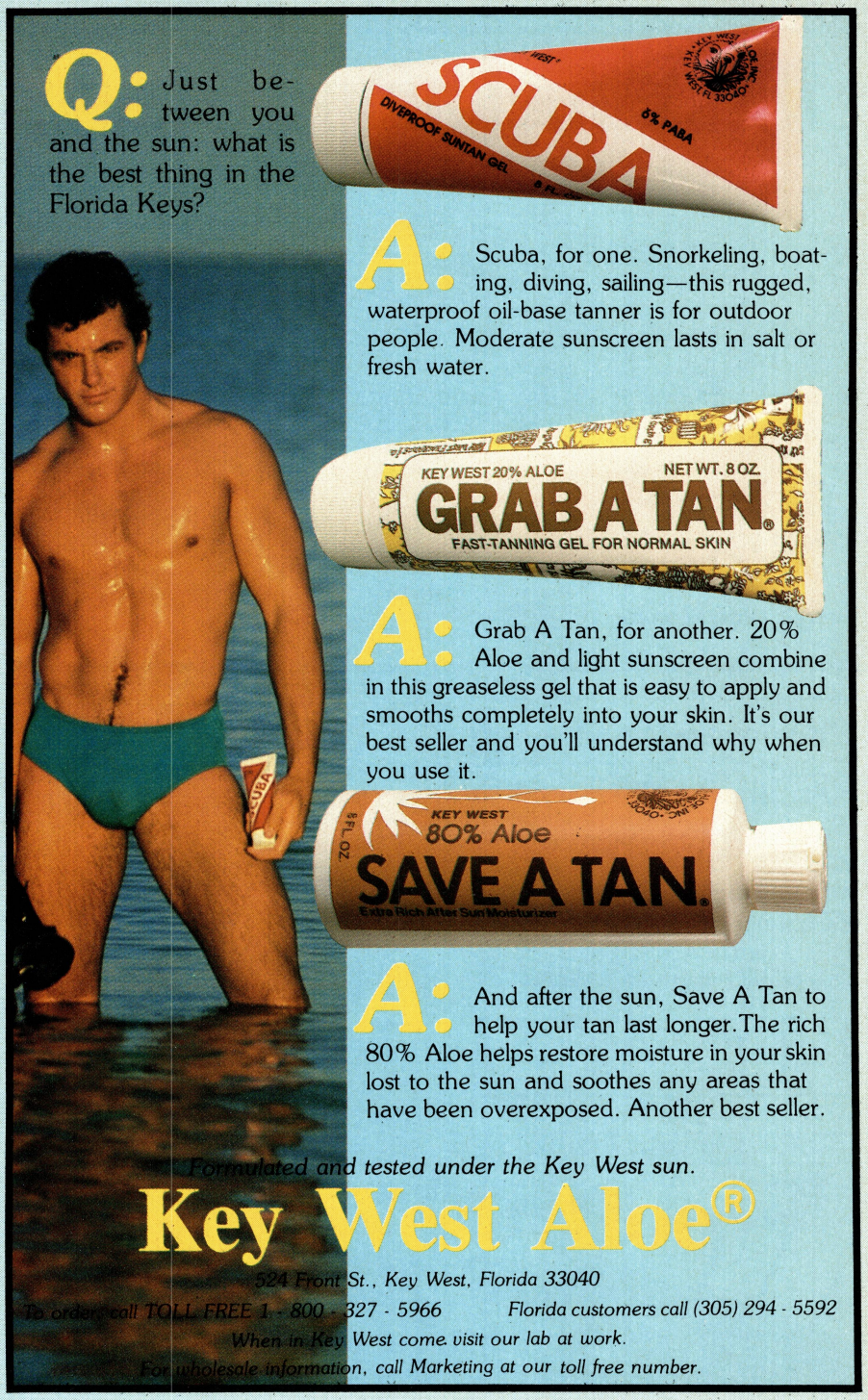
Sand Key is the most visible of the Key West reefs owing to a large lighted tower and large, exposed sandbar. This area is especially popular with the numerous snorkel boats departing downtown Key West. Depths range from 2 to 25 feet.

There are actually three Sambo Reefs, eastern, western and middle and each offers slightly different diving. **Eastern Sambo** is characterized by small coral heads and ledges and is host to large numbers of lobster and tropical fish. **Middle Sambo** features a fascinating, nearly vertical drop-off from 30 to 60 feet. **Western Sambo,** among other features, has the wreck of a tugboat sitting upright in 80 feet of water.

Just off the Sambos at 30 to 60 feet runs the **Ten Fathom Ledge.** These are rock ledges which form a haven for grouper and all manner of tropical fish. Visibility is generally good here owing to the proximity to the Gulf Stream, a factor which also brings in the big pelagics.

Shallow water snorkeling and diving are available at **Rock Key, Eastern Dry Rocks** and **Western Dry Rocks**. In these areas the sand bottom is at 25 feet, at the most, and the high profile coral heads come within inches of the surface.

Some of the more interesting wrecks include the ***Alexander***, a destroyer escort sunk in 35 feet of water on the gulf side. In some winds it can't be dived because of poor visibility, but with other winds it may be even better than ocean-side. The ***Wilkes-Barre*** wreck has become a pet project of Capt. Billy Deans of Reef Raiders and while I have not dived it, friends claim it to be a truly exciting dive. The wreck itself is a 600 foot World War II cruiser which was sunk intact in 1972 as part of the artificial reef program. There are giant guns in turrets, schools of pelagic fish swarming the



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Florida Keys

decks, colorful coral and sponge encrustations and the occasional shark or eagle ray encounters which make wreck diving so memorable. There is a catch though, the *Wilkes-Barre* is deep, 145 to 190 feet to the upper decks, and well over 200 feet to the lower decks. The dive is made as a carefully calculated decompression dive and includes a final decompression stop breathing pure oxygen. Naturally, not every diver should undertake such an adventure, for the depths are really beyond the recommended range of the sport diver. It is included here only as an example of the variety of diving available in Key West.

The **Cannonball Wreck** is one of the shallow water wrecks which has yielded spikes and cannonballs in the past, but is now marked primarily by scattered ballast. **Eye Glass Bar** is another reef, one mile south of the main reef line, with the bulk of the reef at 25 to 30 feet and a 45 to 60 degree slope on the south side, finally bottoming out at 130 feet with heavy concentrations of basket sponge and gorgonian coral.

Key West is accessible by both auto and airplane. Air Florida, PBA, and Dolphin Airlines serve Key West from Miami. It should also be noted that the Florida Keys curve gradually to the west, so that conditions which may make diving bad in Key Largo can make conditions good in Key West and vice versa. The direction of the wind, as much as its intensity, governs the quality of the sea conditions and it is an unusual weather pattern indeed which would blow out the diving throughout the Keys.

Because the Upper Keys are within an hour's drive of Miami, and good roads and service facilities exist throughout the Keys, the Florida Keys feature one of the world's most accessible coral reefs. As such, the dive shops from Key Largo to Key West host more divers annually than anywere else in the world. This is Dive Country U.S.A., and a natural resource of which we can be proud.

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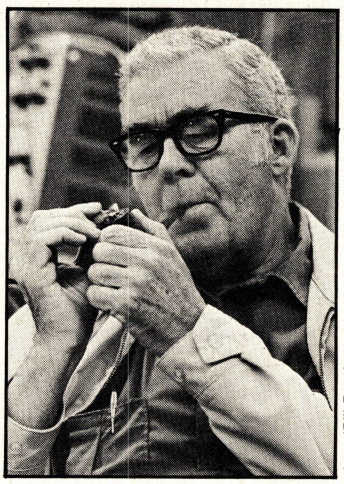
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George F. Bond, M.D., the "father of saturation diving," died January 3, 1983 in Charlotte, NC. He was 67.

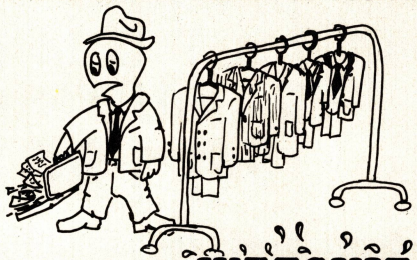
Captain Bond, a retired Navy medical officer, was the mind and driving force behind the Sealab I, II and III (1964-1969) projects. These underwater habitats were placed at 70, 205 and 600 feet, respectively. Aquanauts lived and worked in and from the first two from 15 to 30 days at a time. Sealabs I (off Panama City, FL) and II (off La Jolla, CA) were considered extremely successful. But, the death of an aquanaut at the beginning of Sealab III, off San Clemente Island, CA, caused the abortion of that project and the end of the Navy's Man in the Sea program.

Bond was born in a backwoods Appalachian community about 15 miles from the tiny village of Bat Cave, North Carolina. He returned to the area after medical school, building a community hospital that was the smallest general hospital in the nation at the time. From 1946 until 1953 he served the Bat Cave area as its only physician. Then, he was ordered to report for military service in the Korean War. It turned out that more doctors weren't really needed, but instead of admitting its mistake and sending him home, the military offered Bond the choice of serving in either the Air Force or the Navy. Dr. Bond opted for the one with the highest pay schedule, ending up in deep sea dive school. He loved it from the very first day.

Dr. Bond did not orginate the concept of saturation diving—so called because body tissues become saturated with gases over a period of days—but he made it a reality. He developed, tested and proved the techniques and theories needed for man to live and work for indefinite periods deep on the sea floor.

Much loved and respected by his

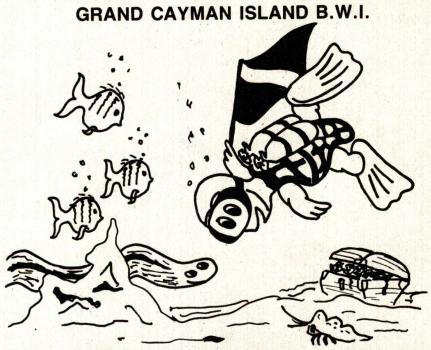
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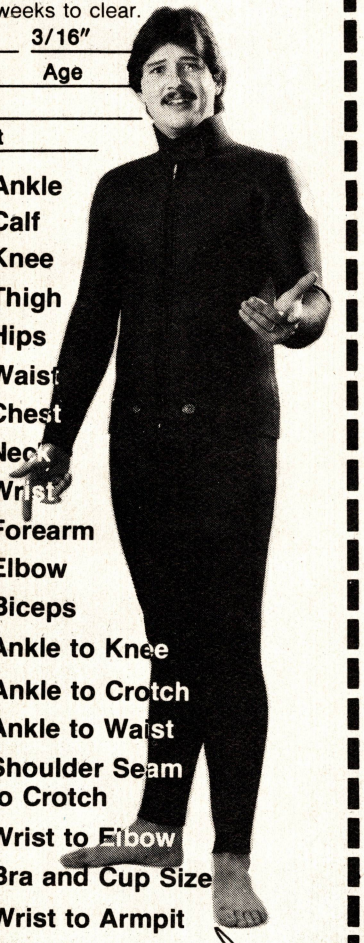
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WRECK FACTS

(Continued from Page 48)

so perhaps our readers, many of whom are wreck buffs, might help. Please drop Alan a note if you know anything about the 1769 wreckage of the *Live Oak*. Alan's address is, 10 Point Breeze Drive, Hewitt, NJ 07421.

David Kinter, Yardville, New Jersey, writes: "The Italian luxury liner, *Andrea Doria*, holds a strange fascination for me. I would like to know what type of cargo is on board and its estimated value. I heard there was a chandelier in the first class dining room that was made of gold and hand-cut crystal, all valued at $5 million. Please send me some information about this famous shipwreck."

David, your fascination is shared by thousands of divers. According to an article in the New York Times, July 27, 1973, here are some of the sundry items purported to be aboard the *Andrea Doria*: cash, jewels, china, silverware, paintings sealed in watertight containers, 25 cases of vermouth, five tons of provolone cheese (well aged by now!), a fancy automobile, and two bronze ship propellors, the latter estimated to be worth $20,000. A silver plaque aboard ship is supposed to be valued at $250,000 and the countless silver place settings are probably worth a fortune as souvenirs.

If you can locate Peter Gimbel, I'm sure he can elighten you on the ship's contents, especially the purser's office where he retrieved one of the safes. Meanwhile, you might read Alvin Moscow's book, *Collision Course*, and write to the following insurance agencies: Underwriter's Division, Lloyd's of London, London, England; Marine Insurance Division, Insurance Company of North America, 1600 Arch Street, Philadelphia, PA 19101.

In my next column I'll answer all of Ronald Weisneck's questions about the *Lusitania*, discuss the treasure of Poverty Island, respond to more inquiries about wrecks in the Gulf of Mexico, and keep all shipwreck *aficionados* informed about their favorite wreck sites.

Until then, write to me: Ellsworth Boyd, Rt. 2, Box 408, White Hall, Maryland 21161.

GEORGE BOND

aquanauts, Capt. Bond was nicknamed Papa Topside by them.

Bond was an excellent scuba and free diver. He and Cyril Tuckfield once made a free ascent from 322 feet; a record at that time. At the age of 60, he was still making breath hold dives of up to three and one-half minutes duration.

Retiring from the Navy in 1975, Dr. Bond returned to his birthplace and his first love, serving the isolated community as its only doctor once more.



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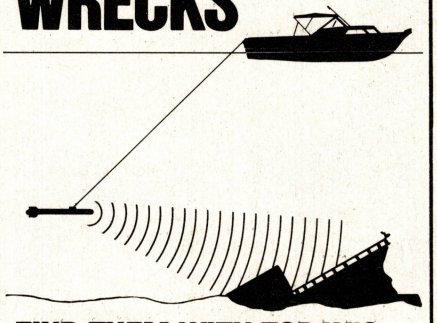
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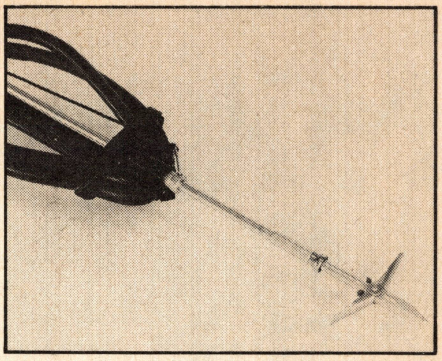
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Cavalero POLYNESIA ARBALETE

TEXT AND PHOTOGRAPHY BY FRED FISCHER

The Arbalete Polynesia Standard speargun has been in production, with minor improvements, since 1937 when it was developed by Rene Cavalero. The proven popularity of this old standard may be owing in part to the practical design and size. Measuring 50 inches in length it is large enough to be outfitted for big game fish or dressed down for smaller reef fish.

The Polynesia is very slender in appearance. It is black, for the purist who wants to minimize reflections which could possibly spook the prey. O-ring sealed plugs in each end of the one inch diameter, anodized aluminum barrel maintain an air chamber so the gun becomes positively buoyant after the shaft is discharged. Two one-half by 20 inch black rubber slings are standard with the gun and a third may be added if necessary. The tough nylon muzzle is designed to route the slings parallel to the shaft for greatest accuracy and minimum vibrations. The 5/16 inch cadmium plated steel shaft with 6 mm threads measures 41 inches without the tip. Unlike many speartips, the one which comes with this gun has a 6 mm male rather than female connection. It attaches to the shaft through a short adapter sleeve which reinforces the coupling. The twin barbed tip also has a replaceable faceted tip. The black nylon shock cord stretches four times from the muzzle to handle. A shock absorber is not included and could be added for easier loading and less strain on the slip ring.

The contoured aluminum handle has a convenient layout. The shock cord release rests forward of the trigger and near the barrel to reduce the chance of snaring the cord in kelp, etc. On top of the handle is the red safety switch. It can be actuated with the thumb of either the right or the left hand. Some may find the S and F markings difficult to read. A sighting notch is on top of the handle and lines up with a point on the muzzle.

Since the Polynesia Standard is almost in the large gun category a fair amount of strength is required to pull the slings. This is especially true when the first sling is stretched to its limit on the back notch, a full five inches behind the second notch. Unfortunately, there is no butt stock behind the handle to give the spearfisherman additional mechanical advantage. As expected, repeated tumbling of the gun did not induce any prefiring. Since nylon cord stretches somewhat, the diver should adjust the length of the shock cord while it is wet.

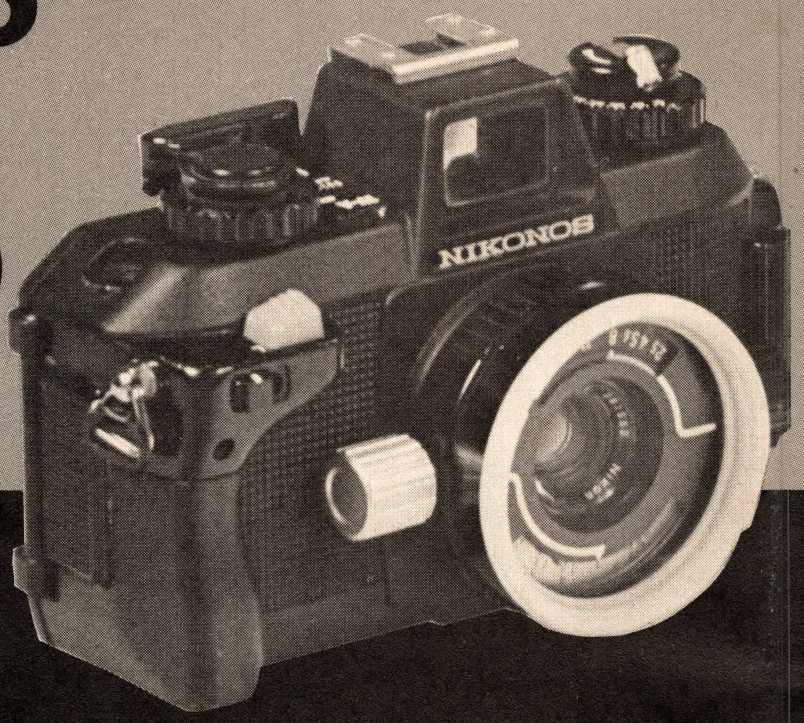
Cavalero/Inflatable Systems recently obtained the rights to import the Arbalete line of spearguns into the United States. Harry Ruscigno, president of the company and an avid spearfisherman for 30 years, outlined extensive plans to provide proper service for the guns. A complete line of tips, slings, reels, etc. will be available so the guns may be customized to the fishing conditions of any area. Ruscigno strongly suggests that new spearfishermen talk to experienced dive shop personnel for advice on which speartips and hunting strategies may apply to game in their area.

A one year warranty against manufacturing defects is provided for each new Polynesia Standard gun. Also, parts and service are available for any of the older Arbalete spearguns from Cavalero/Inflatable Systems.

For more information on the Arbalete Polynesia Standard speargun contact your local Cavalero/Inflatable Systems dealer or 600 N. Batavia Street, Orange, CA 92666; (714) 639-6662 if a dealer is not nearby. The suggested retail price for the gun is $79.25.

NIKONOS VS. HOUSED SLR

which is best for you?



TEXT AND PHOTOGRAPHY
BY JIM AND CATHY CHURCH

Which is best: The Nikonos or SLR? This question has provoked many arguments because each system has its advantages and staunch supporters. And the issue is even further clouded because there is often disagreement among SLR users as to which particular camera, lens or housing is best.

CLOSE-UPS

For close-ups with image/subject ratios from about 1:1 to 1:3, a Nikonos and extension tube are often easier to use than a housed SLR. You can follow a moving subject such as a tiny shrimp or crab quickly with the extension tube framer and focus is correct when the framer is moved into position.

With the housed SLR, however, small moving subjects are harder to follow. And, SLR viewfinding and focusing will be even more difficult in dim light, especially if you and your camera are being jostled by current or surge. Also, the housing can bump against coral, rock or even the subject when you are working with close-focusing 50 and 55 mm lenses. But, for stationary subjects such as a plume worm, that may be difficult to approach with a wand or framers, SLR viewfinding and focusing is best.

For image/subject ratios of about 1:3 to 1:10 and especially for fish about two or three feet away, the housed SLR is usually king of the mountain. The most widely-used lenses are 50 and 55 mm macro lenses, although some U/W photographers use longer lenses (such as the 105 micro) for subjects that are hard to approach.

COMPOSING CLOSE-UPS

You can see the composition and perspective of the picture in the SLR viewfinder and can adjust picture area to match subject size. With the Nikonos, you are estimating composition and perspective because you don't see the picture area from the same angle as the camera lens, and you are restricted to the picture area of the close-up lens or extension tube you are using. And, if you are using a simple wand for aiming and distance, you must also estimate the picture area by eye. If you use a framer that outlines the picture area, the framer could bump or frighten your subject.

LIGHTING CLOSE-UPS

With a Nikonos and extension tube or close-up lens, you can see the relative positions of the camera, strobe and subject at the moment the picture is taken. Thus, if you are doing advanced multiple strobe lighting techniques, it is often easier to position your strobes or reflectors correctly. By squinting your eyes at the moment you trigger the shutter, you can see where strobe light is striking.

With a housed SLR, adjustable arms allow you to position the strobe at a variety of angles. However, you can't see the relative positions of camera, strobe and subject when your eye is pressed against the back of the housing to see the viewfinder port. Thus, as you change camera-to-subject distance without taking your eye from the viewfinder, you may accidentally upset the aim of your strobe. Also, not only does the movement of the SLR mirror prevent you from seeing the strobe light strike the subject, it may prevent you from seeing the strobe flash!

AIMING AND FOCUSING AT LONGER DISTANCES

At U/W distances greater than about



Both the Nikonos amphibious camera and housed SLR systems can be useful tools for the U/W photographer. Your choice depends on your needs.

three feet, the Nikonos is usually aimed with the built-in viewfinder or an accessory viewfinder attached to the top of the camera body. This simplified system allows quick aiming, but you must usually guess at the camera-to-subject distance. With practice, however, you can train your eye to estimate distances with reasonable accuracy. And, because the viewfinder is above the lens, you must adjust for parallax. While some viewfinders have an adjustment for this, it is often easiest to simply aim a few inches above the intended center of the subject when working close.

Although housed SLR cameras are bulkier than a Nikonos, aiming with the SLR viewfinder may be just as easy at medium and long distance. But fast focusing may be a problem, especially with wide-angle lenses, moving subjects and dim light. If you are using a close-focusing lens or a normal lens with a supplementary close-up lens behind a dome port, at medium and long distances the focusing scale will be compressed. Thus, when rotating the focus control knob rapidly, you can easily turn it past the point of sharpest focus without ever seeing it. And with wide-angle lenses, this problem is magnified because of depth of field.

ACTION AND MOVEMENT

For fast action sequences, or for close-ups when you wish to hold the camera motionless, an SLR with motor drive is best. Manual film advance can be awkward if you are holding the strobe with your left hand and holding the camera housing and triggering the shutter with the right. It is also difficult to hold the Nikonos IV-A steady with one hand as you advance film and trigger the shutter in fast sequence. One-handed camera operation, however, is much easier with the older Nikonos cameras.

Camera and subject movement can cause blurred pictures when sunlight provides the primary light for an exposure. While the relatively slow strobe synchronization shutter speed of 1/90 second for a Nikonos IV-A or 1/60 second for a Nikonos, I, II or III may not be fast enough to stop the action, the faster 1/200 second shutter speed of a Nikon FM2 will synchronize with strobe to stop fast action. (Note: As this article went to press, Nikon introduced the Nikon FE2 which has the world's fastest flash synchronization, 1/250 second.)

DARKENING THE BACKGROUND

Suppose you are photographing a large fish about three feet away. For this example, assume that both your strobe exposure table and your exposure meter reading call for an f 5.6 exposure at 1/90 second. You look at the scene and notice a cluttered, distracting background. With a Nikonos, you might be able to hold the strobe a little closer and use a higher-number stop to darken the background. Or, you might have to completely change your camera angle.

But with the 1/200 second shutter speed of the housed Nikon FM2, the strobe exposure for the fish remains unchanged. Only the sunlight background is darkened by increasing shutter speed. By moving the strobe in closer and using a smaller aperture, background can be darkened even more.

CHOOSING LENSES

The choice of lenses for a housed SLR can be more specialized and extensive than for a Nikonos. But for wide-angle U/W photography, we believe the Nikonos 15 mm lens is usually the best choice. When placing a wide-angle lens on a housed camera, remember the limiting factors will be the accuracy of the radius of the dome and the alignment of the lens to the dome. We've seen many wide-angle pictures, taken with expensive wide-angle lenses, with unsharp corners because of poor dome port optics.

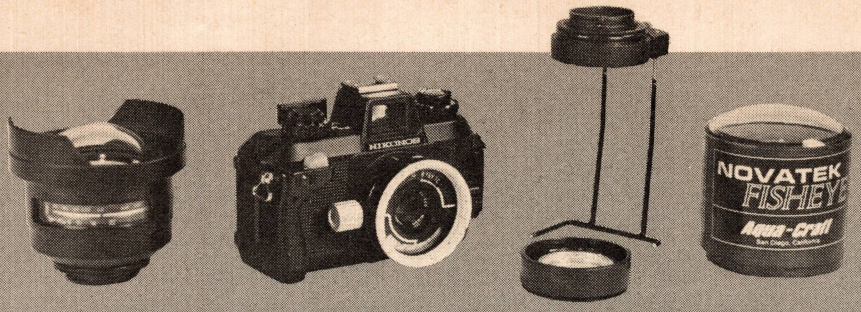
EASE OF OPERATION

A Nikonos system is often easier to assemble and reload than a housed camera system. On numerous occasions, we've seen U/W photographers return to the beach or boat because a focus or aperture control ring slipped out of adjustment, a PC connection worked loose, or some other housing-related mechanical problem occurred.

But, this isn't to say that all Nikonos systems are troublefree. We've seen Nikonos users forget to flood the space behind their filter or screw-in close-up lens, or, with older models, shoot entire rolls of film on R (rewind). Also, we must admit that modern housings are easier to use and maintain than many older models.

THE BOTTOM LINE

Which is best? There is no universal answer because each system does a different job! It's strictly a matter of which system satisfies your particular needs. In our case, we use both. For 1:1, 1:2 and 15 mm wide-angle, or anytime when simplicity and fast action are important, we use a Nikonos, although there are times when motor drive would be a better choice. When we move up to the 1:3 and larger close-up areas, or when a wand or framer would frighten a subject, we use our housed Nikon.



BUILDING A NIKONOS SYSTEM

A Nikonos system is compact and flexible. You can build a system for wide-angle or close-up U/W photography, or both, and often have a choice between lower and higher-priced accessories.

The Nikonos IV-A has a built-in automatic exposure control for sunlight exposures and synchronizes with strobe at 1/90 second. The four Nikonos lenses—with focal lengths of 15, 28, 35 and 80 mm—are interchangeable with any Nikonos body, and the Nikon close-up outfit can be used with the 28, 35 and 80 mm lenses. The Nikon SB-101 strobe can be set for full or quarter power, or for two stops for automatic exposure control. The SB-101 beam angle covers the 35 mm lens; and with the SW-101 beam spreader, the 28 as well.

Several other companies also manufacture or distribute lenses, strobes and accessories for the Nikonos.

CLOSE-UP EQUIPMENT

Extension tubes are available at many dive shops and are used to photograph tiny subjects with 2:1, 1:1, 1:2 and 1:3 image/subject ratios. An extension tube fits between the Nikonos camera body and the lens, and reduces the focused distance to just a few inches. The camera has a focal frame that you place around your subject. While increasing the versatility of the camera, extension tubes can't be removed underwater.

Both Aquacraft and Hydro Photo have supplementary close-up lenses that can be used with Nikonos 35 mm and 28 mm lenses. These allow you to photograph picture areas of about 4 x 6 inches and larger. They are aimed with a wand attached to the accessory viewfinder shoe, or with a framer or wands attached to the accessory lens. All of these can be installed underwater.

For higher quality, you can choose the more expensive Nikon Close-Up Outfit. It fits over the Nikonos 28, 35 and 80 mm lenses and produces U/W picture areas of approximately 6 x 9, 4 x 6 and 2 x 3 inches, respectively. The camera is aimed by placing a field framer around the subject.

STROBES FOR CLOSE-UPS

A small, inexpensive strobe is ideal for U/W close-ups. The Aquacraft Novatek, Ikelite Substrobe M, Oceanic 2000, Sea & Sea YS50 and Subsea Mark 30 are all typical choices. You can sometimes save money by minimizing the number of arms and brackets and simply hold the flash head in your hand or with a simple handle. These strobes can be used with extension tubes, close-up lenses and with your Nikonos 35 mm lens at distances up to about four or five feet.

If more power or other features such as slave sensors or automatic exposure control are desired, strobes such as the Helix Aquaflash 22, Nikonos SB-101, Oceanic 2002 or 3003, Sea & Sea YS50A or Sunpak Marine 32 are available.

WIDE-ANGLE ADAPTERS

The least expensive wide-angle lens adapter is the Aquacraft Novatek 20. It fits over the Nikonos 35 mm lens and widens the angle of view to approximately that of a 20 mm lens. Aquacraft doesn't have a wide-angle viewfinder, so you either have to buy one from another distributor or estimate with your regular viewfinder. Aquacraft also has a fisheye lens adapter that fits over a 35 or 28 mm lens for extreme wide-angle photos.

Oceanic distributes the Subawider II, a wide-angle adapter that fits over the Nikonos 35 mm lens and widens the picture angle to about 90 degrees. The Subawider II can be focused from 0.25 meter (about ten inches) to infinity, and a wide-angle viewfinder is furnished with each.

WIDE-ANGLE LENSES

Two wide-angle lenses are currently available in the U.S. for the Nikonos: The Sea & Sea 18 mm and the Nikon 15 mm UW Nikkor. The Seacor 21 mm lens is no longer in production, but several of these may be on the used lens market. While all of these lenses will fit any model Nikonos camera body, only the latest Nikon 15 mm UW-Nikkor f2.8N lens will work with the automatic exposure control of the Nikonos IV-A.

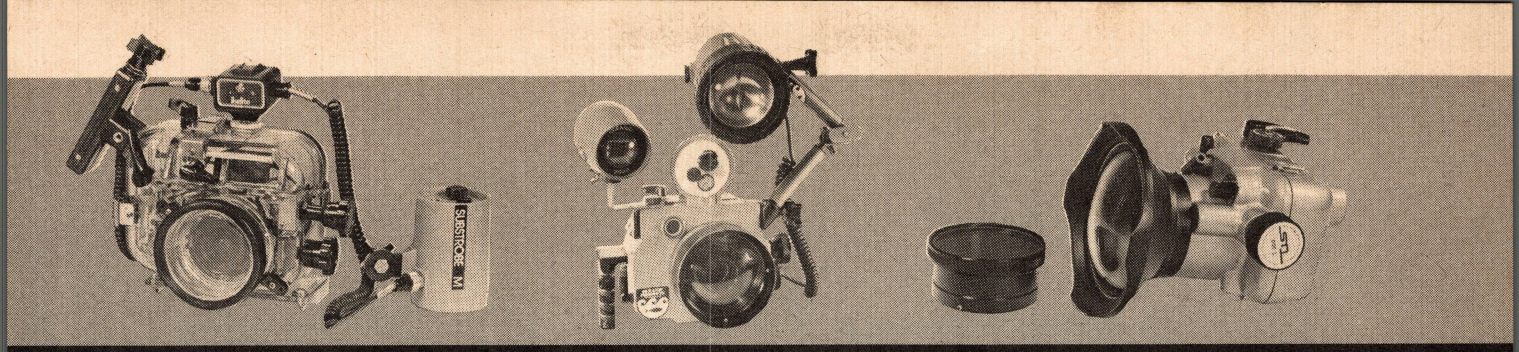
The Sea & Sea 18 mm lens, which supersedes the Sea & Sea 20 mm lens, has an 84 degree picture angle. The focus scale reads in meters, and focus can be set from 0.35 m (about 14 inches) to infinity, and the aperture range is f3.5 to f16. This lens doesn't have a depth of field scale, but a depth of field table is included in the instructions. The optical viewfinder has an adjustable parallax correction.

The top of the line wide-angle lens for the Nikonos, in our opinion is Nikon's 15 mm UW-Nikkor f2.8N lens. It has a 94 degree picture angle, an aperture range from f2.8 to f22, and a focus range from 0.3 m (about 12 inches) to infinity. The large focused distance and depth of field scale is shown in both feet and meters. The large viewfinder produces large, bright, sharp images.

STROBES FOR WIDE-ANGLE

A wide-beam strobe is usually required for wide-angle U/W photography. Most U/W photographers use special wide-beam submersible strobes such as the Ikelite Substrobe 75L or 150L; Oceanic 2001, 2002 or 2003, Sea & Sea YS150; and Subsea Mark 100 or 150. These feature beam angles of 90 degrees or more and are bulkier, heavier and more costly than normal beam strobes.

Wide-angle diffusers are available for the Sea & Sea YS50 and Sunpack Marine 32. But to widen the beam to about 90 degrees or more, the power output will be reduced two stops.



BUILDING AN SLR SYSTEM

There are too many cameras, lenses and housings to give you a full description of each. Therefore, we will concentrate on the basic viewfinding systems and lenses we believe to be best, and will describe three housings built in the U.S.

VIEWFINDING AND FOCUSING

Many small SLR viewfinding systems are difficult to use in a housing. You see only the center area of the small viewing screen and must shift your eye to see the four corners. And because your eye is drawn to the center of the screen, composition at the edges of the picture suffers.

Therefore, we recommend cameras for which oversized accessory viewfinders are available, such as the Canon F-1 and Actionfinder, Nikon F, F2 and F3 with the DA Series Sportsfinders, and the Pentax with the FC-1 Action Eyepiece. For cameras that don't accept oversized viewfinders, we recommend using eyepiece magnifiers that screw into the accessory threads of the camera viewfinder. Before buying a housing, ask if a magnifier will fit.

CHOOSING LENSES

You can do most of your U/W photography with two lenses: a 50 or 55 mm macro lens for close-ups and fish photography, and a 24 mm lens for medium and wide-angle photography. Longer lenses can be added later for photographing unapproachable critters, and wider lenses can be added for extreme wide-angle photography. If you intend to start with a standard 50 mm lens, you can use standard screw-in close-up lenses and a flat port for U/W close-ups. A close-focusing lens however, would give a greater focusing range.

IKELITE SLR CASE

The Ikelite SLR Case is adaptable to most 35 mm SLR's, and there are probably more of these in use than any other 35 mm SLR housing. Eight interchangeable ports are available for standard, macro, telephoto and wide-angle lenses. The SLR Case can house the Canon, Nikon and Pentax cameras which accept oversized viewfinders, and the latest model housings (or replacement backs for older models) will accommodate eyepiece magnifiers. The rear element of Ikelite's magnifier is almost one and one-quarter inches in diameter, the largest we've seen.

Ikelite also has normal beam and wide-beam Substrobes, and the necessary bars and brackets to attach Ikelite Substrobes or Ikelite strobe housings to the SLR Case. A T connector and the Ikelite Flash Monitor with a slave sensor are available for multiple strobes.

OCEANIC HYDRO-35

The Oceanic Hydro-35 aluminum housing is for the Nikon F and F2 with motor drive, the Nikon F3 without motor drive, and the older Canon F-1, all with oversized viewfinders. Although larger, heavier and more expensive than many other housings, it has excellent U/W handling qualities, especially when used with twin Oceanic strobes mounted on Oceanic ball-joint arms.

For a versatile two-strobe system at minimum expense, you can mount an Oceanic 2001 on the left side of the housing with a ball-joint, and an Oceanic 2000S cordless slave on the right with a homemade L bracket.

Three lens ports are available: a corrected flat port for close-focusing lenses, a dome port for wide-angle lenses up to about 24 mm and a fisheye dome port for wider lenses. Extension rings are available for using the flat and standard dome ports with telephoto lenses.

TUSSEY T-300

The Tussey T-300 aluminum housing is the most compact SLR housing currently available. It is available—without shutter speed control—for the Canon A-1 and AE-1; Minolta XDs, XGs and SG-M; and Nikon FG. It is available—with shutter speed control—for the Canon AE-1 Program and Nikon FE, FM and FM2. We recommend the Nikon FM2 for its 1/200 second strobe synchronization.

To keep the housings small, inside clearances are as close as 1/16 inch, and the housings won't accommodate the oversized Canon and Nikon viewfinders. A magnifying eyepiece is supplied with each T-300 housing and a special viewfinder port extends from the rear of the housing to accommodate it.

Three interchangeable ports are available: The 1:2 macro port accepts fully extended 50 and 55 mm close-focusing lenses. The 1:1 macro port accepts 50 and 55 mm close-focusing lenses with extension tubes and the dome port accepts lenses as wide as 24 mm.

Tussey doesn't manufacture U/W strobes or strobe housings, so you will need to adapt strobes and strobe arms of other manufacturers to the basic bar and handle system available from Tussey.

The main advantage of the Tussey housing is compactness. However, the small size does cause a few problems: It is difficult to see anything inside, such as the aperture, focus or shutter speed scales, or if a PC cord is fouled in a control gear. Also, we would modify the shutter release lever so that it is a bit longer and easier to operate.

Tussey has other housings in production or in the planning stage that we haven't tested. The Pro-line for the Nikon F3 with motor drive and action finder has ports for lenses from 105 mm telephoto to 20 mm, and fiber optic lighting for the exposure display in the viewfinder.



AVON SR 4M SEARIDER

An inflatable fiberglass blend for exceptional stability in adverse conditions

TEXT AND PHOTOGRAPHY BY ERIC HANAUER

To say I was apprehensive would be putting it mildly. The waves were breaking over the jetty at Newport Harbor and the horizon looked like wall to wall haystacks. Mother Ocean was still in the angry mood she had displayed throughout the California winter. But Seagull Marine's Curt Tiffany assured me that the Avon Searider was made for just such conditions. And my apprehension was tempered by curiosity as to the capabilities of an inflatable boat with a fiberglass hull. This would certainly be a rigorous test. If the vessel could cope with these conditions it could handle nearly anything. We decided to go for it.

The Searider, at first glance, looks like the illegitimate offspring of an inflatable and a fiberglass boat. Actually, that's the idea. It combines the handling characteristics of a deep-V hull with the light weight and buoyancy of an inflatable. The tubes are bonded to the hard hull with a process which is patented by Avon, resulting in a craft so seaworthy that it has been adopted by marine search and rescue agencies throughout the world. Stability in adverse conditions is its forte, and Tiffany was ready to show me.

As he gunned the 50 horsepower engine the boat hesitated for just a few seconds, then went up on a plane at about 30 knots. It felt a lot faster. Looking up at a six foot swell, I grabbed the passenger assist handle and ducked my head below the windscreen. The Searider took off over the top of the wave, thudded forward into the trough, and proceeded to challenge the next one. My knuckles turned another shade of white. It was quite a roller coaster ride, deserving of a Disneyland E ticket. Curt asked me if I wanted to drive. "No thanks," I replied. "You know what the limits of this thing are." He grinned and threw it into a tight turn, pulled out to gain some speed, then yanked the wheel in the opposite direction. The unflappable Searider responded with no skidding and cut right through the next swell.

The ocean was a mess, a nasty combination of big swells and wind chop. No diver in his or her right mind would be out in a small boat under such conditions. But through it all the Searider felt safe and stable. We even stayed relatively dry, with spray coming over the windscreen only on the biggest swells and the wildest maneuvers. All the same, I was happy to return to the calm of the harbor to learn more about this unusual vessel.

The Seariders were developed originally as rescue boats in the North Atlantic. Manufactured by Avon since 1967, they are used today in a variety of ways, from safety boats in North Sea oilfields to boarding launches on United States Coast Guard ships. The five meter version is said to be capable of operating under Force Eight conditions on the Beaufort Scale. That means gale force winds, landlubbers.

Avon's secret is the combination of a rigid deep-V hull and inflatable buoyancy. The buoyancy is provided by three compartments in the hull, in addition to three to five in the tubes, depending on the length of the boat. At rest, the hull's bow chamber fills with water ballast to increase stability and reduce freeboard for easy entry and exit. Thus, it has the balance of a conventional inflatable at rest. When the boat picks up speed, the water quickly drains through a hole in the stern to lighten the craft for planing. The momentary hesitation before climbing up on a plane is owing to the weight of the ballast water before it is ejected.

The chines of the hull are engineered to give efficient performance through all loading conditions. Even if the tubes were totally deflated, the hull would serve as a craft itself—it would still float and carry its passengers.

Our test boat, provided by S & R Sporting Goods, Stanton, California, was the SR 4M DeLuxe model. It is four meters, or 13 feet, 4 inches long, and weighs 338 pounds in the four seat version. That's

more than a normal inflatable, but a lot less than a comparable rigid boat. The advantageous power to weight ratio allows high performance with a long shaft engine from 25 to 50 horsepower. DeLuxe models come equipped with bow-dodgers and windscreens, in addition to a bow console with a steering wheel. Drivers and passengers sit inside the boat, on upholstered seats. Our boat had two sets of them, back to back; an ideal setup for water skiing but not optimum for diving owing to the limited storage space. It can be ordered without the rear facing seats, or else one set of front and rear seats can be left out. Either method will save $200 in cost and 50 pounds of weight, as well as increasing room for dive gear.

The boat is also available in a Rescue version, which provides yet more open space. A padded center console furnishes motorcycle style seating for the driver and a passenger, along with remote steering. The bow is open, allowing gear storage there as well as in the stern and alongside the console. Rescue is merely a model designation. The boat is readily available in the sport market, although it is used by many marine safety agencies in its stock form. On the other hand, special commercial versions are available at lengths up to eight meters. At the warehouse, I saw a six meter model, sporting twin 70 hp outboard motors!

Aside from the hull, Seariders follow standard Avon practice in terms of materials. The tubes are made of a nylon base, with an 80 percent Hypalon, 20 percent neoprene mixture calendered on both sides. Curt Tiffany pointed out that Avon is one of the few manufacturers which use Hypalon inside as well as outside, because of added resistance to heat buildup combined with light weight.

The long standard equipment lists vary among the DeLuxe and Rescue models.

AVON SEARIDER SR 4M

Overall length	13'4"
Interior length	9'7"
Overall beam	5"10"
Interior width	3' 1"
Tube diameter	17" tapering to 15"
Weight	Rescue: 350 pounds
	DeLuxe: 283 pounds (2 seat)
Payload	1430 pounds
Capacity	Rescue: 4 divers
	DeLuxe: 3 divers
Horsepower range	25 to 50, long shaft
Hull	Fiberglass deep-V
Number of chambers	3, plus 3 in hull
Tube material	nylon/Hypalon/neoprene
Price	Rescue: $4,995
	DeLuxe: $4,420 (2 seat)

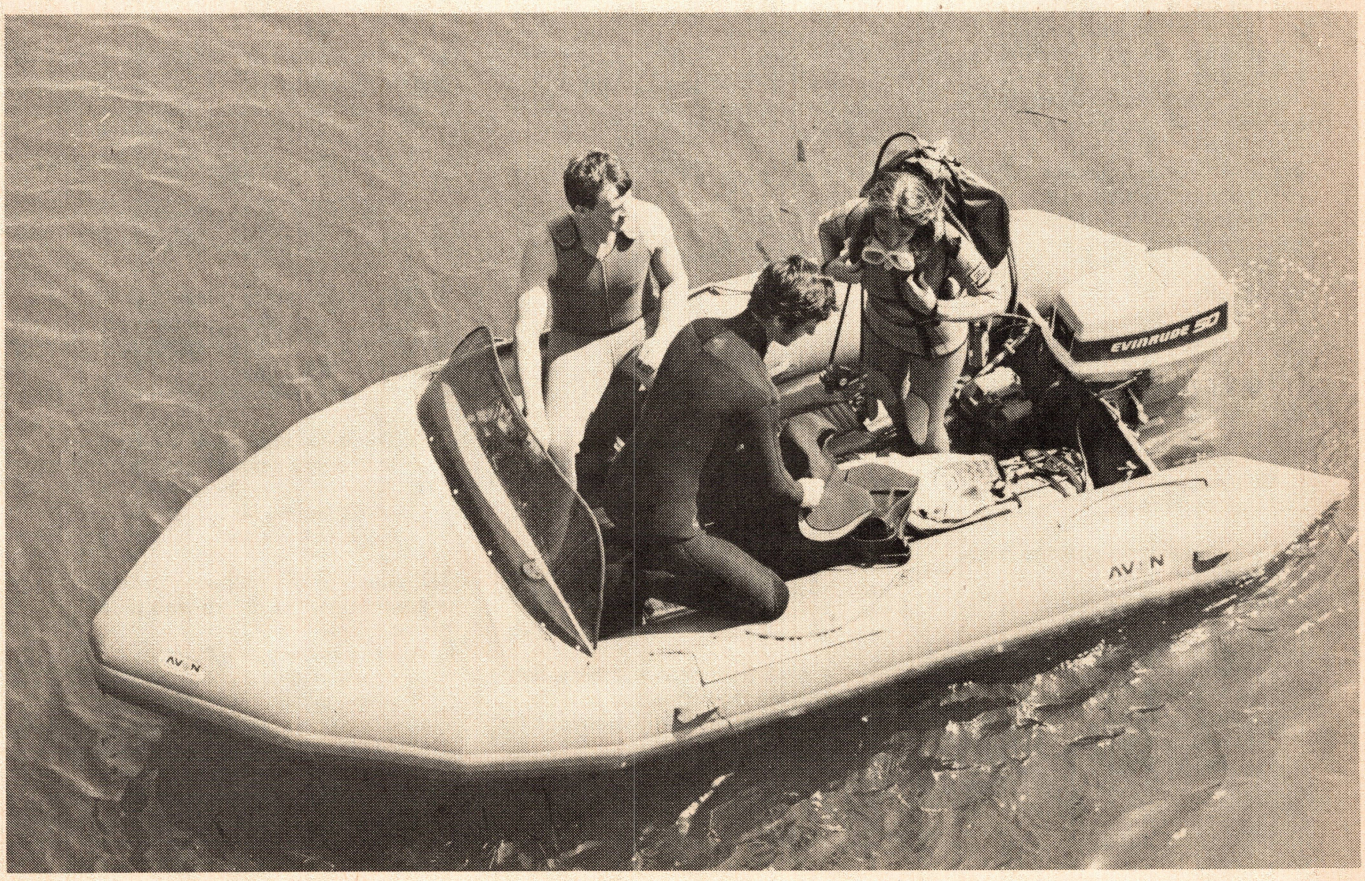
Unlike many boats, both are virtually complete as they come off the showroom floor. Just add a motor and a trailer and away you go.

Where do the Seariders fit into the diving picture? They are multi-purpose boats, well adapted for water skiing and cruising as well as diving. The ride and handling are superior to the conventional inflatable boat. On the other hand, the owner must be willing to sacrifice some portability and interior space. The boat will have to be trailered to the launch site, and stored on its side with the tubes deflated. Thus, it will take up more room in the garage than a standard inflatable. Even in the Rescue configuration, the SR 4M will be hard pressed to accommodate four divers.

But if long offshore trips and safety in adverse conditions are high priority, the Searider deserves serious consideration. The four meter DeLuxe two seater sells for $4,420 at your Avon dealer. The Rescue version of the boat can be had for about $500 more.

ERRATUM

In the article on the Avon Rover 3.80 (SDM February 1983), recommended keel pressure for conventional Avon boats was erroneously given as one half psi. The correct recommended pressure is one and a half pounds per square inch.



Scuba Quiz

Category: Game Taking

By Dennis Graver

The taking of game while diving is a controversial issue, but the fact remains that fish, lobster, abalone and other goodies are sought and obtained by many divers. Those who do hunt for food beneath the surface of the water need to know proper game taking procedures, some of which are addressed in the following quiz. Select the most correct answer to each question. The answers are on the next page.

1. A rule of thumb indicates that _____ should be taken on the West Coast of the U.S. only in months containing an R.

- ☐ A. Clams
- ☐ B. Mussels
- ☐ C. Filter feeders
- ☐ D. All of the above

2. Which of the following may be poisonous if eaten:

- ☐ A. Barracuda
- ☐ B. Puffer fish
- ☐ C. Moray eels
- ☐ D. All of the above

3. When removing an abalone from a rock, a diver should:

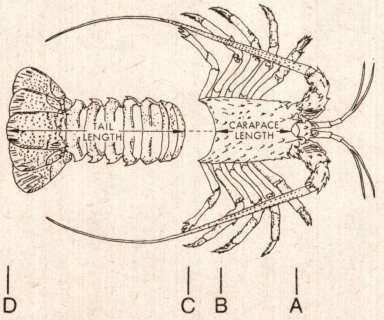
- ☐ A. Push down on the handle of the abalone iron
- ☐ B. Pull up on the handle of the abalone iron
- ☐ C. Push sideways on the handle of the abalone iron
- ☐ D. First measure the size of the abalone accurately

4. Within the waters of the U.S., the most effective legal method of taking lobsters is:

- ☐ A. With disabling chemicals
- ☐ B. With a spear or hooked device
- ☐ C. By hand
- ☐ D. By removing them from a trap underwater

5. The legal size of a lobster is determined by measuring from:

- ☐ A. Point A to Point C
- ☐ B. Point B to Point D
- ☐ C. Point A to Point B
- ☐ D. Point A to Point D



California spiny lobster, tail separated, showing measurements taken.

From *Calif. Fish and Game*, 55 (2) : 121-131. 1969.
Authors Charles T. Mitchell, Charles H. Turner, and Alec R. Strachan

6. If a spearfisherman misses a fish and gets another shot, the fish should be approached the second time from:

- ☐ A. The same side
- ☐ B. The opposite side
- ☐ C. The front
- ☐ D. Any direction. It makes no difference.

7. The best situation for spearfishing is:

- ☐ A. Having the sun behind the diver
- ☐ B. Working with the flow of the current
- ☐ C. Diving during high tide
- ☐ D. All of the above

8. Which of the following is generally true:

- ☐ A. Spearfishing is permitted in the mouths of rivers
- ☐ B. The spearing of game fish in freshwater is prohibited
- ☐ C. The legal limit of freshwater abalone is five per day
- ☐ D. All of the above

9. When undersized game is taken, when more than the legal limit of game is taken, or when game is taken out of season:

- ☐ A. No harm is done if the diver isn't caught
- ☐ B. The game in the area will be temporarily reduced
- ☐ C. It makes up for the days when no game was taken
- ☐ D. None of the above

10. Which of the following practices is appropriate for divers who take game:

- ☐ A. Female lobsters with eggs attached should not be taken
- ☐ B. Game taken which will not be eaten by the taker should be given to friends
- ☐ C. Fish and game regulations should be followed whenever feasible
- ☐ D. All of the above

Scuba Quiz

Answers: Game Taking

1. D. All of the above. During summer months—those not containing an R—blooms of plankton occur. Filter feeders, which include clams and mussels, filter the plankton from the water and concentrate it within themselves. This concentrated plankton is extremely toxic to man. It cannot be neutralized by cooking.

2. D. All of the above. Barracuda, jacks, groupers and other fish may—at times—contain a poison known as ciguatera. Not all of the fish of these species contain the poison, which cannot be easily detected. Other fish, such as puffers and box fish, are continuously poisonous. Moray eels may be poisonous. To avoid problems, learn from local divers and fishermen the species of fish which are safe for consumption.

3. B. Pull up on the handle of the abalone iron. Abalone have no coagulants in their blood. If cut, they bleed to death, thus, it is very important not to injure an abalone until it has been accurately measured to ensure legal size. An estimated measurement made before taking an abalone is a good idea, but an accurate one will cause the animal to adhere tightly to the rock and will greatly increase the removal difficulty.

4. C. By hand. Throughout the U.S., the use of implements or chemicals to take lobsters is illegal, as is their removal from commercial traps. Game wardens frequently mark lobsters and place them in traps. Divers robbing the traps are then caught with the evidence. No matter how hard they are to catch, lobsters should be taken only as specified in fish and game regulations.

5. C. A to B. The legal size for lobster or langusta (the kind without claws) varies slightly in different regions, but is slightly over three inches measured in a straight line on the midline of the back from the rear edge of the eye socket to the rear edge of the body shell. The use of a caliper type measuring device is strongly recommended for accuracy.

6. B. The opposite side. The brain of a fish receives a separate image from each eye, and is unable to correlate the two. If approaching a missed fish on the same side as approached initially, a diver will not be able to get as close as he/she did with the first shot. On the opposite side, however, the diver has a good second chance.

7. D. All of the above. Fish feed at high tide and with the current. With the sun behind the diver, fish are less likely to spook. Some spearfishermen seem lucky, but their success is owing to an in-depth knowledge of fish and the habits of the fish. Any diver can spear fish, but getting good game fish consistently requires a high degree of skill and conditioning.

8. B. The spearing of game fish in fresh water is prohibited. In nearly all states, only trash fish, such as carp, may be speared by divers. Be familiar with local regulations. Spearfishing at the mouths of rivers, especially where salmon are present, is illegal as well as hazardous. And, by the way, there are no freshwater abalone.

9. D. None of the above. Fish and game regulations are designed to ensure game will be available in the future, not to deny divers seafood. Violation of regulations upsets the projected yields and jeopardizes future stocks. We must be conscientious, recognize that the resource is limited, do our part as individuals and make sure that other divers do likewise.

10. A. Female lobsters with eggs should not be taken. While not a law in all areas, this is definitely a good practice to ensure propagation of the species. Another good practice is to take only what will be eaten by the family of the person taking the game. Giving away or throwing away food acquired while diving is to be disdained and avoided. Fish and game regulations are absolutes, not guidelines, and must always be followed to the letter.

Do you take game? If so, are you conscientious about it? With some divers, the attitude is, "Can I get away with it?" rather than, "Is it right to do this?" Often, the issue is moral rather than legal. It may be legal to take an animal; but if its population in the area is quite sparse, is it then right to take the creature? To be responsible divers, we need to make wise use of the underwater resources, including the game. This is a matter of personal attitudes and decisions. By learning more about the environment and the game we wish to take, we will better understand our role as takers of game. Consider enrolling in a specialty course in underwater hunting.

THE DIVER'S EDGE

A Revolutionary Electronic Device Which May Change The Destiny Of Divers

BY BRUCE BASSETT, Ph.D.



Author Bruce Bassett wearing E.D.G.E.

photo/Geri Murphy

The introduction of scuba in the 1940s and '50s brought new dimensions of freedom and mobility to diving. Divers were, for the first time, free from surface support and control. They could move freely up, down and about the underwater environment. These features made such equipment highly desirable for a new category of divers: the recreational/sport diver. However, a major restriction existed which prevented *true* freedom and mobility: the decompression tables, designed and tested for surface-supported divers who usually spent their bottom time working at a fixed depth.

The introduction of the E.D.G.E. by Orca Industries in 1983 brings an innovation to sport divers equal to the original introduction of scuba. This device may very well change the way sport divers will be able to dive, *safely*, in the future.

What is the E.D.G.E.? The word itself has many meanings. It is an acronym for Electronic Dive GuidE. Use of the device gives the individual an edge over other sport divers equipped with only the standard decompression/repetitive dive tables. During the progress of any dive, the display screen shows how close the diver is to approaching the edge of the Surface Nitrogen Limits, which are presented as one singular line on the screen. Finally, the E.D.G.E. provides the diver an important built-in safety edge.

The E.D.G.E. is the brainchild of two dedicated sport divers, Karl Huggins and Craig Barshinger. Huggins, a diver since 1977 and a biological oceanography graduate from the University of Michigan, became interested in decompression theory during his studies there. In his four years at U of M, he mastered the theory and computation of decompression, and developed sophisticated computer programs dealing with the subject. Huggins' knowledge of decompression theory includes all aspects; he is as up-to-date as anyone working in the field today. He is currently pursuing a graduate degree in biomedical engineering.

Barshinger's degree is in biology/chemistry, with graduate studies in marine biology in France. His diving background is extensive, with experience as a dive instructor/guide in the Virgin Islands. It was during his period in the VI that he conceived a diver-carried computer to track gas uptake and elimination during multi-level, repetitive dives.

Huggins and Barshinger met at an instructor training course. With their combined experience, expertise and intense interest, they developed the concept of a device to meet the needs of the sport diver. This resulted in the formation of Orca Industries, Inc. and the eventual development of the E.D.G.E.

The unit's working parts are comprised of a pressure transducer (electronic depth gauge), a pressure activated timer, a microprocessor and a liquid crystal display (LCD). The unit itself consists of a

waterproof alloy case, measuring about 7¼ x 2¾ inches. It has a display screen measuring 1¾ x 2 inches, two arm straps and an externally mounted magnetic on/off switch on the back side. The battery (one nine volt alkaline) is in the bottom of the unit in an O-ring sealed compartment. The entire unit with battery weighs one pound 10½ oz.

To appreciate *how* the E.D.G.E. works requires an understanding of the theory of decompression, as incorporated in the U.S. Navy Tables. Nitrogen uptake and elimination by the body during exposure to depth, during ascent/decompression, and during periods spent on the surface, are estimated by a mathematical model. This model assumes the body is comprised of a number of different tissues with differing rates of gas uptake and elimination.

In the U.S. Navy Standard Air Decompression Tables and in the E.D.G.E., these different tissues are represented by assigning arbitrary half-times to such tissues. Thus a five minute half-time tissue takes up, or eliminates, 50 percent of the gas pressure difference to which it is exposed in five minutes; 75 percent in ten minutes; 87.5 percent in 15 minutes; etc. A 20 minute half-time tissue would take 20 minutes to reach 50 percent equilibration; a 120 minute tissue would take 120 minutes, and so on.

In the U.S. Navy Tables, the changes in gas pressures are calculated for discrete periods of time, as presented in the tables. For example, if a dive is made to 91 feet for 21 minutes, the resulting gas pressures in each half-time tissue are calculated for 25 minutes at 100 feet.

The E.D.G.E., by comparison, is a true multi-level dive computer because of the *continuous* depth-monitoring by the pressure transducer, and the *continuous* monitoring of elapsed time by the built-in timer. It therefore continuously calculates the changes in gas pressure as they are occurring. Because the device is continuously monitoring your precise depth, it has the edge over the tables in calculating the gas pressure at 91 feet, instead of using 100 feet. As divers move down, up and around the underwater environment, the microprocessor is calculating (every three seconds) the gas uptake and elimination by 12 tissue groups, with half-times ranging from five to 480 minutes.

The tables, which are based on six tissue groups with half-times of five to 120 minutes can never provide the moment-by-moment accuracy for multi-level diving that the E.D.G.E. affords. Even when using the tables for multi-level dives (see Rx for Divers, SDM, March 1983), it is possible to exceed critical gas loading in some tissues. This can occur because the Navy's repetitive dive tables (which are used in solving multi-level dive problems) are based on only the slowest tissue (i.e. 120 minute half-time).

As described, one aspect of decompression consists of the calculation of gas uptake and elimination by theoretical tissues using a mathematical (half-time) model. Ascent limits, based on gas loading of these same tissues, represent the other aspect of decompression. To ascend safely to a shallower depth, or to the surface, the maximum tolerable gas pressure in a given tissue must be known. Through manned testing at the Experimental Diving Unit in the 1950s, a set of maximum tissue values (called M-values) was established. These values represent the limits built into the Navy tables.

In more recent laboratory studies using manned testing of Navy no decompression dive schedules, Dr. Merrill Spencer in Seattle, and this author in San Antonio, found a bends incidence of 5-8 percent when dives were conducted to the exact established limits of depth and time. This indicated that the limits were not sufficiently conservative. By reducing the maximum tissue values (M-values), this author was able to eliminate the bends in further manned tests.

The E.D.G.E. uses reduced M-values, which are based on the more recent laboratory findings, thus providing a significant safety edge. Since M-values determine ascent limits, the single dive no decompression limits built into the E.D.G.E. are more conservative as seen in Table 1. It can be seen that the limits are greatly reduced from Navy limits at the shallower depths. This is necessary because of the slower tissues which control limits at shallower depths and is consistent with the previously mentioned manned tests.

Table 1
Single Dive

Depth (fsw)	No Decompression Limits (min) U.S. NAVY	E.D.G.E.
30	none	231
40	200	139
50	100	75
60	60	53
70	50	39
80	40	31
90	30	24
100	25	19
110	20	13
120	15	10
130	10	9
140	10	8

Another safety edge is provided by the device in multi-level diving, since all tissues are considered, instead of just the slowest tissue as when using the tables. This prevents exceeding established limits for any tissue, since the device will indicate, both graphically and by digital display, when any tissue reaches its limit.

To use the E.D.G.E., the diver simply flips on the magnetic switch. The display screen will first show a checkerboard pattern, and then change to a blinking orca (killer whale) pattern, followed by initialization. At this point, the display will look like Figure 1.

The top number will display the temperature in °C. If the battery is low in voltage, the display will indicate LO. The next three entries (ceiling, depth and dive time) will indicate zero and the bottom entry (no decompression time) will begin timing a surface interval alternating with the diver's no decompression limits.

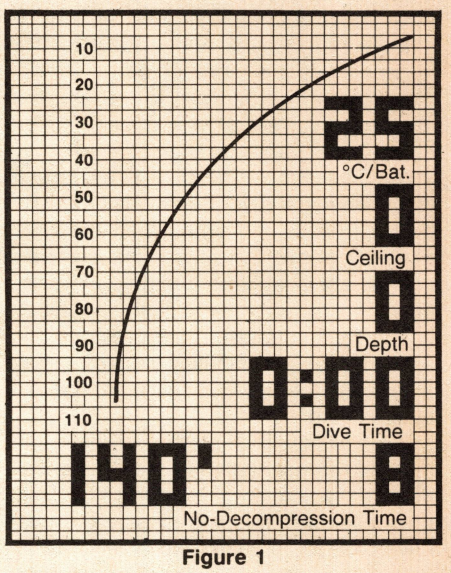


Figure 1

Descending will cause the display (which is a 32 x 40 square-dot LCD matrix, divided into a graphical section, above and left of the curve, and a digital section, below and right of the curve) to be activated. During the dive, the display will present the following information (refer to Figure 2):

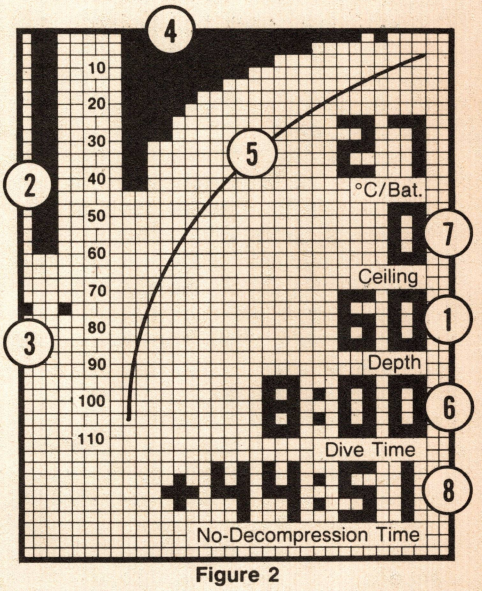


Figure 2

(1) Present/Maximum Depth—When the dive is underway, this area displays the present depth of the diver. At the surface, this will display the *maximum* depth of the previous dive, so it may be logged.

(2) Depth Bar—This presents a graphical representation of the present depth to 132 fsw (feet of sea water).

(3) Maximum Depth Recorder—These ears on the depth bar indicate the maximum depth achieved during a dive.

(4) Tissue Pressure Bars—These bars

present a graphical representation of the nitrogen levels in the twelve tissue groups, and the distance from their Surface Nitrogen Limits (M-values) represented by #5.

(5) Tissue Surface Limit Line—As long as the bars remain above the Limit Line, the diver is in a no decompression dive. If any of the bars cross the limit line, the diver must decompress long enough to pull the bar(s) back above the line. The faster tissues are represented on the display by the bars farthest to the left, and are progressively slower moving to the right of the graph.

(6) Dive Time—The dive timer is activated when the diver descends below 6.5 fsw; it freezes the time when the diver ascends above 3.3 fsw. If the diver descends again within ten minutes, the timer will continue to add time (excluding time on the surface) to the previous dive time. If over ten minutes elapses before a descent, the E.D.G.E. will reset the dive time to zero.

(7) Ceiling—This display gives a numerical representation of the diver's ceiling, i.e., when no decompression limits are exceeded, this will display the *shallowest* depth to which the diver may ascend. As long as the display remains 0, the diver can ascend to the surface. If the diver ascends to a depth *shallower* than the ceiling, a warning, Descend Now, will be displayed.

(8) No Decompression Time, Decompression Time, Surface Interval Time, Repetitive Dive Time—This multi-purpose display indicates the most important information to the diver, i.e., the no decompression time or decompression time during a dive, and alternating between a surface interval time and a repetitive dive time table, while on the surface.

During a no decompression dive, the Remaining No Decompression Time is displayed for the present depth in minutes and seconds with a plus (+) sign before the numerals. If the time display is greater than + 99.59, the display will indicate +Hrs. If the diver descends the time gets shorter; if he/she ascends, the time will increase.

If the diver stays longer than the No Decompression Time, the number will be replaced by an up arrow. As the diver now ascends toward (but not above) the Ceiling the up arrow will be replaced by a minus sign. This will be followed by the Decompression Time required at the present depth (in minutes and seconds) in order to safely ascend to the surface.

After the Decompression Time has elapsed, the Remaining No Decompression Time for the present depth will once again be displayed. The E.D.G.E. will not allow a diver to decompress at any depth where the time after decompression is less than five minutes.

At the surface, this section displays the diver's Surface Interval (in hours and minutes), alternating with the Repetitive Dive Time information for all depths between 30 and 170 fsw. This is displayed as Depth, followed by the Repetitive No Decompression Time in minutes for that particular depth.

This author recently performed evaluations of the E.D.G.E. (a prototype model), both in open water dives and in a pressure chamber. The following describes the results of some of these tests:

The March '83 SDM Rx for Divers column was devoted to multi-level diving. It is in this area, and even more so in repetitive diving, that the E.D.G.E. really performs to the sport diver's advantage. Using the example from Rx for Divers, a dive was made to 120 feet for ten minutes, with an ascent to 40 feet for an additional 30 minutes before surfacing.

With no knowledge of multi-level use of the tables, a diver surfacing from such an exposure may worry about the bends, or even consider going back down to decompress, after realizing a total bottom time of 40 minutes at 120 feet exceeds the no decompression limit. Even logic telling the diver not to worry, since most of the dive was shallower than 100 feet, does not convey how to handle another dive on the same day.

Using the method explained in the aforementioned article, the diver finds that the first dive was in fact, a no decompression dive, with a surfacing repetitive group letter of G. In planning a second dive, the diver finds the following maximum allowable bottom times according to the surface interval:

Surface Interval	No Decompression Limits (min) at Indicated Depths										
Hrs:Min	30	40	50	60	70	80	90	100	110	120	130
0:41	none	139	53	24	19	12	6	0	0	0	0
1:16	none	151	62	30	24	17	10	7	0	0	0

In an identical dive profile, the E.D.G.E. demonstrated its performance during the dive, its safety edge and its advantage in repetitive diving:

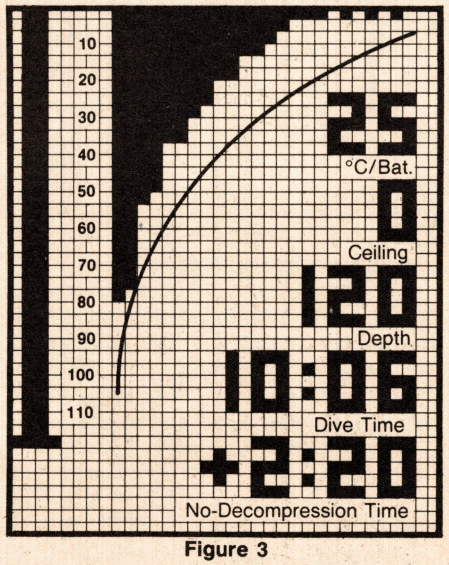


Figure 3

Figure 3 presents the display after ten minutes (actually six seconds over) at 120 feet. Note that the Tissue Pressure Bars for the fastest tissues (to the left) are close to, but have not crossed, the Tissue Limit Line. Therefore, no ceiling is displayed and the Remaining No Decompression Time is two minutes and 20 seconds. While the no decompression limit of the E.D.G.E. for 120 feet is 11 minutes, the total dive time, plus no decompression time, is 12 minutes 26 seconds. This edge occurs because the device, as opposed to the tables, does not assume the dive starts at 120 feet. Instead, it takes into account the depths and time spent in the descent.

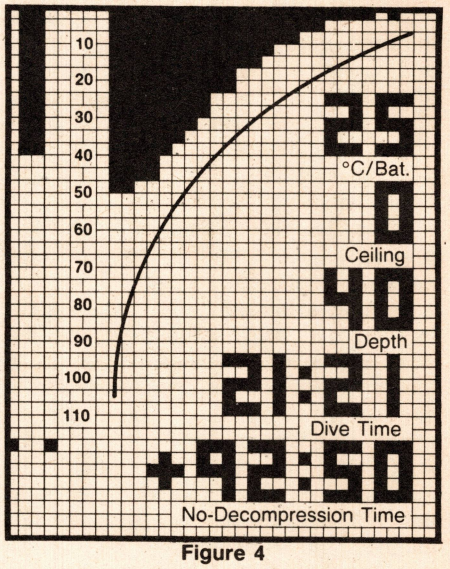


Figure 4

Figure 4 presents the display after ascending to 40 feet in one minute and 15 seconds, and spending ten minutes at that depth (dive time = 21 minutes and 21 seconds). The maximum depth of 120 feet is indicated by the ears at the left.

The Remaining No Decompression Time is 92 minutes and 50 seconds. With the E.D.G.E.'s limit at 40 feet being 139 minutes, this indicates that the dive profile to this point has been equal to 46 minutes and 10 seconds spent at 40 feet. The Tissue Pressure Bar values for the faster tissues are now less than in Figure 3, but are greater in the slower tissues (to the right on the display).

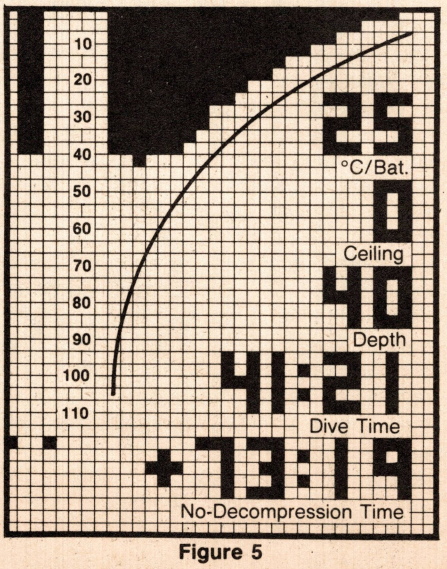


Figure 5

Figure 5 presents the status at the end of 30 minutes at 40 feet, with a no decompression time remaining of 73 minutes and 19 seconds. The Tissue Pressure Bars reflect a further decrease in the faster tissues, and a further increase in the slower tissues.

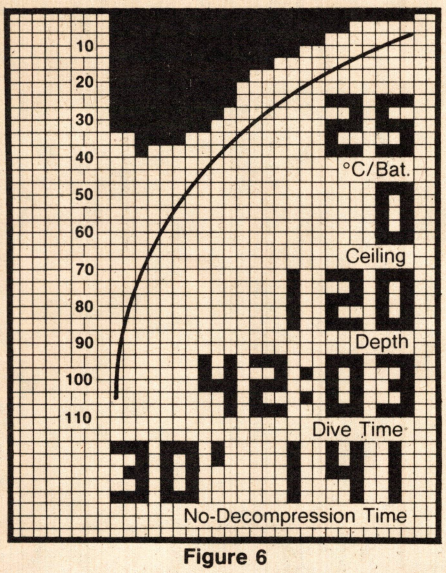


Figure 6

Figure 6 was the display upon surfacing in 42 seconds from 40 feet. Note that the depth now displayed was the maximum depth attained of 120 feet. The No Decompression Times immediately started cycling through the revised time limits as follows:

Depth	30	40	50	60	70	80	90	100	110	120	130
Limit	141	73	32	19	14	11	9	7	6	5	5

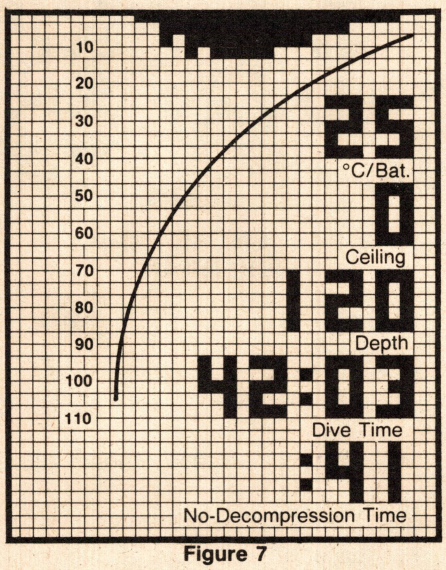


Figure 7

Figures 7 and 8 respectively show the displays after a 41 minute, and a one hour and 16 minute surface interval. The No Decompression Times were:

Surface Interval	No Decompression Limits (min) at Indicated Depths										
Hrs:Min	30	40	50	60	70	80	90	100	110	120	130
0:41	155	93	61	41	31	25	21	18	13	11	9
1:16	161	101	68	47	35	29	24	19	13	11	9

A comparison with the results using the Navy Tables previously presented, reveals that the E.D.G.E. allows less time for repetitive dives at 30 and 40 feet (which is in keeping with laboratory findings), but more time for repetitive dives at 50 feet or greater:

Surface Interval	No Decompression Limits (min) at Indicated Depths (E.D.G.E. Limits minus Navy Limits)										
Hrs:Min	30	40	50	60	70	80	90	100	110	120	130
0:41	-155	-46	+8	+17	+12	+13	+15	+18	+13	+11	+9
1:16	-161	-50	+6	+17	+11	+12	+14	+12	+13	+11	+9

Similar results were obtained with other tests conducted within the range of reasonable sport dives made within no decompression limits.

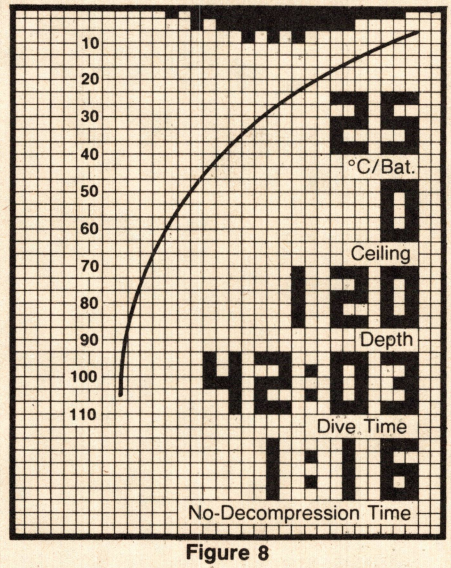


Figure 8

Minimal tests were conducted beyond no decompression limits, but results were consistent with the performance specifications of the E.D.G.E.

During the month of April 1983, (after press time for this article) the developers of the E.D.G.E. planned to conduct an extensive series of manned tests of the device. These tests were designed to push the E.D.G.E. to its design limits with a series of multi-level repetitive dives similar to what a sport diver may perform during a dive vacation. Decompression dives were also to be tested. If problems were encountered in these tests, the microprocessor would be reprogrammed to reflect the test results.

When worn on the inside left forearm, the E.D.G.E. did not interfere with diving and it was reasonably easy for this author to read and use. The LCD display was slightly difficult to read under certain lighting conditions, but the manufacturers are incorporating an improved contrast LCD in the production models.

During the open water evaluations there were two minor malfunctions encountered, both during surface intervals. One was caused by a low battery voltage level (unknowingly using an old battery); the other was caused by accidentally turning the unit off and then back on. The power consumption of the prototype unit is greater than the production models, which have been improved so that one battery will provide a minimum of 12 hours continuous operating time.

One other glitch was noted: The magnetic flip-switch will interfere with a compass, so positioning of these two instruments will be important to the diver. Also, the LCD display is not illuminated (would be yet another power requirement), which makes its use at night, or in caves, somewhat limited. However, it can be easily read with a dive light.

The limitations of the unit are:

(1) The E.D.G.E. can be operated in any temperature of water (-9 to +99°C), but should not be left in temperatures much below or above this range. The LCD may seem sluggish at the lower operating temperatures.

(2) The E.D.G.E. is not programmed to allow dives made at elevations over 1000 feet. The pressure transducer, being an absolute pressure sensor, will correct for altitude, but the microprocessor is programmed for sea level conditions. The manufacturers are working on providing altitude diving capability.

(3) While sport divers should limit their dives to a *maximum* of 130 feet, the device will calculate dives to 160 feet, as yet another safety edge. If the diver exceeds 160 feet, the device will continue to function, but will make all computations based on a depth of 200 feet.

(4) The Dive Timer will time dives up to 199:59 minutes, then recycles to 0:00.

(5) The Ceiling will display values up to 99 fsw.

During NAUI's International Conference on Underwater Education (IQ-8) in 1976, this author discussed decompression devices, stating that such "devices designed to solve the problems of multi-level diving and repetitive diving for the sport diver in principle would be the diver's ultimate safety device." It was stated that "technologically it should be possible to build a device which would give the same results as using the tables."

In 1983, ORCA Industries has gone several steps further in offering the E.D.G.E. to the sport diver market. They have produced a device which provides moment-by-moment calculation of decompression status, which exceeds even the most proficient use of the tables. Furthermore, they have taken the most recent laboratory findings and recommendations into account, thus building an important safety edge into the computer.

Finally, at the 1976 IQ-8, this author concluded the discussion of devices stating, "divers should not expect to attain such a critical piece of life-support equipment at 'dime-store' prices. What is the price tag of a spinal cord? Divers should expect such devices to be in the price range of any of their other life-support/safety equipment; not in the range of nice-to-have accessories." This observation stands today. The E.D.G.E. is available from Orca Industries, 335 Lancaster Avenue, Frazer, PA 19355. It sells for $675.



Sport-craft 222

Roomy cabin offers extended dive trips in a trailerable boat



222 OFFSHORE FAMILY FISHERMAN

Length	22'2"
Beam	90"
Weight	2800 lbs.
Max. hp	I/O 260, Inboard 200
Hull	Deep-V
Fuel capacity	80 gal.

Aptly named the Sport-craft 222 is 22 feet, two inches long. Its combination of size, deep-V hull, large fuel capacity, and cuddy cabin, makes weekend or longer trips comfortable. For shorter trips, the cabin provides dry storage for photo gear.

TEXT AND PHOTOGRAPHY BY STEVE LUCAS

More and more dive enthusiasts are investing in their own dive boats. The reasons are varied, but can probably be explained fairly simply. We are a mobile group and to a degree somewhat independent. When the urge to go diving overcomes us we want to get to the water quickly and explore our favorite underwater habitat. By owning a trailerable dive boat it becomes practical to go when and almost where you please. A common problem with many boats that inhibits our freedom is they are not designed to accommodate divers on overnight excursions. This makes some outings impractical owing to running time and distance. Still worse, when a prospective owner is out shopping for an overnight boat with sleeping accommodations it is frequently difficult to find one that can allow you to stretch out in comfort, unless you happen to be under five feet tall. Well, here is a 22 footer that can take you and a friend or two away in comfort for a weekend or a week—the Sport-craft 222 Offshore Family Fisherman.

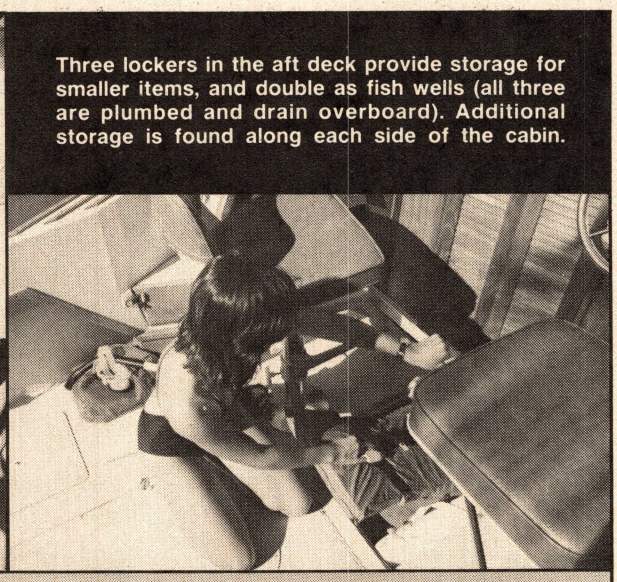
The cabin of the 222 is very roomy and beautifully appointed. There is room for

two six feet tall divers to sleep with comfort and still have room for plenty of gear storage. The cabin's stand-up room is a full five feet, which will make moving around down below much more comfortable than in many competitor's boats. In the cabin's forward portion a large plexiglass hatch allows complete access to the bow section and doubles as a forward seat. The cabin is well ventilated and all windows plus the louvered door are screened to keep out the bugs. An excellent feature of the cabin is its unique step-in which makes entry and exit easy. Between the cabin's V-berths there is room to install an optional marine head with holding tank.

The cabin has a number of obvious uses other than sleeping. A principal use on day trips is the tremendous amount of dry storage where cameras and other gear can be kept in a safe, padded area. Between the berths, tanks can be stored and kept off the deck. Storage areas are not limited to the cabin, and three lockers are located in the aft deck. Although not deep enough (less than nine inches) to store large gear bags and tanks, they are quite adequate to store regulators, masks, fins and other such items. The manufacturer's principal design purpose is fish wells and all three are plumbed and drain overboard. Additional storage is found along each side of the walk-around cabin beneath the forward walkway deck. In fact, the walkways themselves make excellent storage areas while the boat is underway. Gear bags and even tanks can be placed in this area maximizing the free deck space aft. In the bow, a good sized anchor locker with lots of room for rope and necessary equipment is within easy reach.

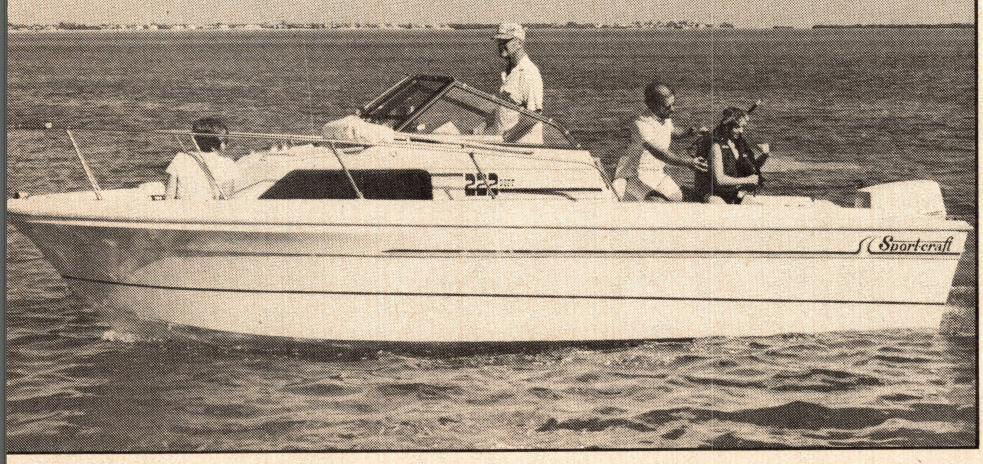
With an overall length of 22 feet 2 inches, the 222 is easily large enough to carry a group of four divers well offshore.





Three lockers in the aft deck provide storage for smaller items, and double as fish wells (all three are plumbed and drain overboard). Additional storage is found along each side of the cabin.

Passengers and divers suiting up will appreciate the 222's open deck space.



The 90 inch beam gives ample space to move around and there is enough room in the aft section to install tank racks along the gunwale. The bow railing is higher than normal and standard fittings and tubing are aluminum. Stainless steel is available as an option and is recommended for more durable wear. To get well out to those favorite reefs or islands Sport-craft has installed a standard 80 gallon fuel tank. The boat is quite seaworthy and is constructed of handlaid fiberglass with a deep-V design. The V-hull allows for the safest operating in moderately rough weather and usually is noted for a drier ride. No boat can be totally dry, so when water does make its way into the cockpit there are large scuppers aft with external flaps to allow quick runoff.

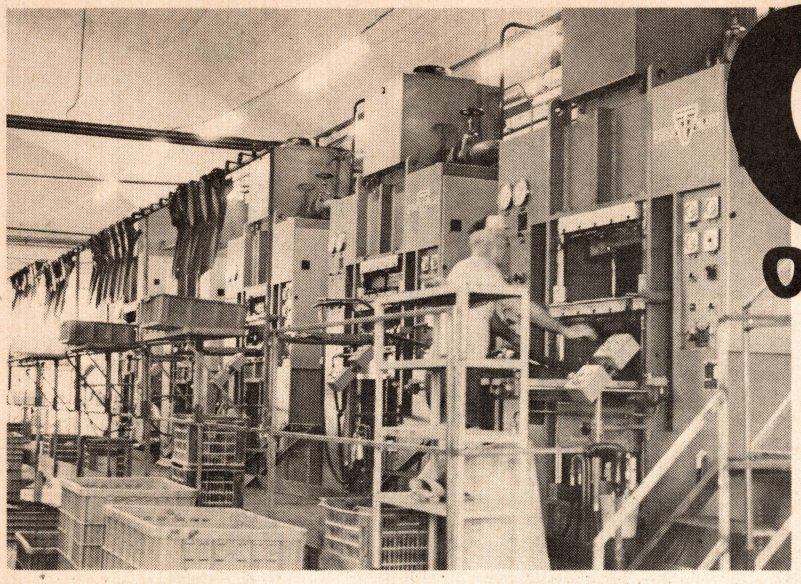
For running in inclement weather or for added protection from the sun, a Bimini top is included as standard equipment. The top has a unique feature which is not provided by most other manufacturers. A clear, flexible curtain is attached between the top of the 222's tinted windshield and the Bimini's forward canvas. The principal advantage is the boat's operator can now see to safely operate the vessel while standing. The curtain keeps spray out of the operator's face and gives additional protection to all other occupants of the boat.

Other standard equipment includes mechanical steering, full fiberglass inner-liner, molded plastic swivel seats, teak trim, bilge pump with float switch, and two mid-ship storage compartments in addition to those already described. Optional equipment can include stern rail with boarding ladder, windshield wipers, side and back-drop curtains, and teak dive platform.

The 222 is available in either inboard or inboard-outboard configurations. Recommended power for the inboard model is in the 175 to 200 hp range. I/O power is available in gas or diesel. Volvo supplies the diesel while gas is available from Volvo, OMC or Mercury. I/O engines available from the factory run from 140 hp to 280 hp. Base list prices for the outboard model begin at $12,708 less trailer, engine and freight. The I/O models run from $17,492 to $27,301 depending on choice of power.

Sport-craft's dealer network is quoted as worldwide but is limited to the eastern half of the United States. Large concentrations of dealers can be found on the U.S. East Coast, in the Gulf states through New Mexico, and northward through Minnesota and the Great Lakes region. West Coast dealers are currently being sought, according to the factory representative John Hewitt.

For dealer information or a catalogue contact: Sport-craft, P.O. Box 351, Perry, Florida 32347; (904) 584-5679.



Cressi-Sub OF ITALY

Europe's Oldest and Best Known Dive Manufacturer

TEXT AND PHOTOGRAPHY BY PAUL TZIMOULIS

The Cressi-sub Company of Genoa, Italy is one of the oldest and best known dive equipment manufacturers in Europe. In the heart of the Italian Riviera, this firm has produced millions of fins, masks and snorkels over the past 40 years and shipped products to all parts of the globe. Cressi is regarded as the world's largest producer of molded neoprene rubber products, specializing in high quality fins for the serious diver.

Cressi-sub is a family corporation which has been handed down from generation to generation. Originally founded in 1942 by the Cressi brothers, the firm has been transferred to Antonio Cressi, son and nephew of the original founders. At age 29, he is an energetic business entrepreneur and charismatic leader. He is also an avid sport diver who loves free diving and occasional spearfishing for a fresh fish dinner. Antonio began diving, when he was eight years old, under the careful tutelage of Enso Dagnino, one of the founding members of the Italian scuba instructor community.

Despite his exhaustive schedule as president of a large manufacturing firm, Antonio devotes much of his spare time to the sea, diving and testing various underwater products. He maintains a seaside apartment for the weekends and cruises the Italian coast in his 34 foot Chris-Craft. Vacations are spent on week long dive trips to the nearby islands of Sardinia and Corsica where the waters are crystal clear.

Cressi-sub is known in the trade as a "primary manufacturer." The company makes its own rubber and rubber products. It grinds its own lenses as well as producing its own facemasks. Manufacturing these products from scratch ensures the highest quality and best designs. Rubber mixing and molding methods are closely guarded family secrets. Cressi does not subcontract any rubber manufacturing nor will it license anyone in foreign countries to produce its products. All fins, masks and snorkels are made right in Italy.

Cressi-sub has factory facilities in two separate areas of Genoa. The main factory and executive offices are at Quinto, an eastern suburb of the city. The rubber factory is 15 kilometers away in an industrial valley. Between the two manufacturing facilities Cressi-sub has the capacity to produce one-quarter million fins and masks annually.

The world headquarters of Cressi-sub at Quinto is a cluster of three or four multi-story buildings closely packed together in a densely populated section of town. This facility employs 50 to 60 people who design, develop, manufacture and ship Cressi products.

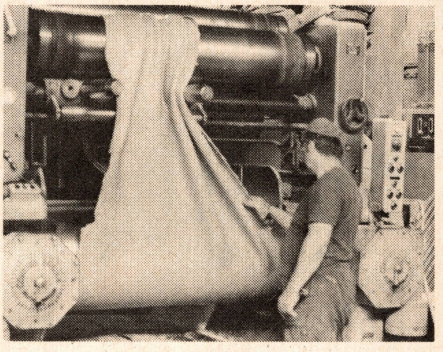
The main building is a three story affair which contains the company's executive offices, plus a complete machine shop and hardware assembly area for regulators, scuba tanks, pressure valves, underwater lights and similar items. Next door is another three story building which houses the Cressi-sub shipping department with a vast warehouse of assembled and boxed goods. It is an awesome array of inventory with row after row of fins, masks, spearguns, wetsuits, regulators and so on.

Upstairs on the third floor level is Cressi's pride and joy—a complete lens grinding department for optical facemasks. Cressi-sub is one of the few dive equipment companies in the world that grinds its own lenses. In fact, the company produces 10,000 optical masks per year.

The lens grinding department features a long row of specially designed lens grinding and polishing machines. There are also special machines for cutting the glass blanks and grinding and shaping the edges. A sophisticated optical collimator is used for a final check on the finished lenses. Cressi-sub not only produces standard correction lenses for nearsightedness and farsightedness, but also grinds custom lenses for any type of astigmatism or aberration: It can handle any type of prescription.

A Cressi-sub optical facemask begins with a sheet of flat optical glass of a specified thickness, depending on the prescription requirements. The greater the optical correction, the thicker the glass must be. The lens blanks are scribed (scratched) on the flat glass with a special cutter that traces out the shape of the blank needed for the type of mask ordered. Cressi-sub grinds lenses for three different mask styles—the Occhio, the Piuma Lux and the Pinocchio.

The glass is then broken along the scored or scribed lines and inserted in a contour machine which grinds smooth the broken edges of the blank. The glass is held in place by a vacuum vise. Next, the blank is placed in a lens grinding machine. Cressi has an inventory of hundreds of grinding shapers for every lens prescription imaginable. The blank moves across the tool in a complex two direction motion while the grinding head is spinning. The blank is checked with special tools as the grinding proceeds.



From grinding, the lens is moved along the line to the polishing machine for the final phase. When it is perfectly polished, the lens is checked by an optical engi-

neer and then inserted into the facemask for shipment to the customer. It is a most impressive procedure. In still another adjacent building, the shipping department, Cressi-sub technicians inspect and assemble facemasks in preparation for boxing. A great deal of time and attention is devoted to quality control. Every piece of equipment is personally inspected prior to shipping.

The Cressi-sub rubber factory is in a narrow country valley among the hills behind the city of Genoa. This factory is the very soul of the company, for it is here that the bulk of Cressi products are manufactured. This facility is a small industrial compound, containing four buildings close to a river. Approximately 35 people work at the rubber factory and many of them are oldtime Cressi-sub craftsmen who pioneered the neoprene rubber molding business. They have devoted their lives to the perfection of high performance fins and form fitting facemasks.

A tour of the Cressi-sub rubber factory is a little bit like a lesson in cooking—industrial style. The business of making rubber is something like baking bread or cookies. One building warehouses stacks of raw rubber in every shape and form imaginable. There are brick sized chunks of raw gum rubber from Malaysia, other types from Brazil and sacks of rubber compound ingredients from all over the world.

Another building contains the mixing machines for blending and kneading the various compounds. The center of this building is dominated by a behemoth two story mixing machine called a Banbury. Into this machine are dumped the various raw chunks of rubber and sacks of mysterious powders. The Banbury grinds the ingredients under heat and pressure.

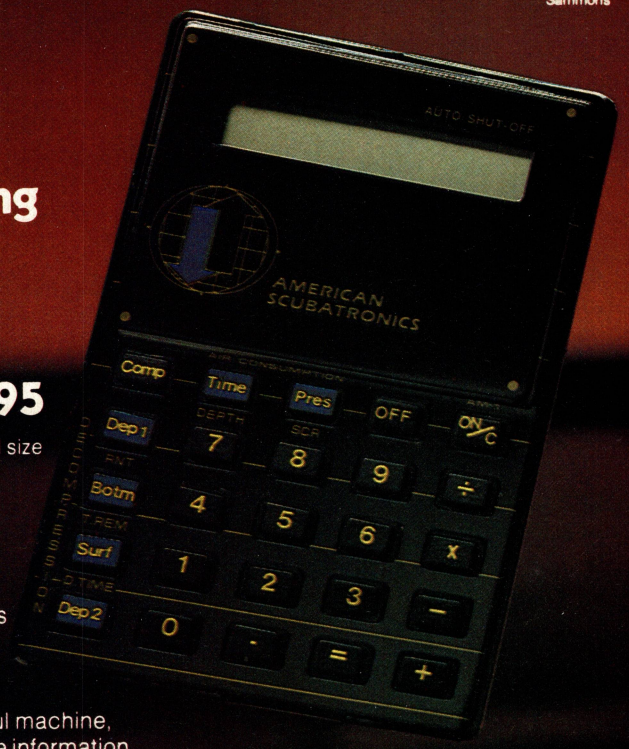
Nearby is a small chemical laboratory which looks more like a baker's kitchen.



The lab is used for measuring, mixing and checking the various rubber compounds. Each compound has a special recipe requiring as many as 20 different ingredients. The changing of proportions can make the rubber softer, stiffer, snappier or more resistant to sunlight. These recipes or formulas are closely guarded secrets. They have been developed and perfected over the last 40 years and represent the key to Cressi's success.

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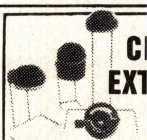
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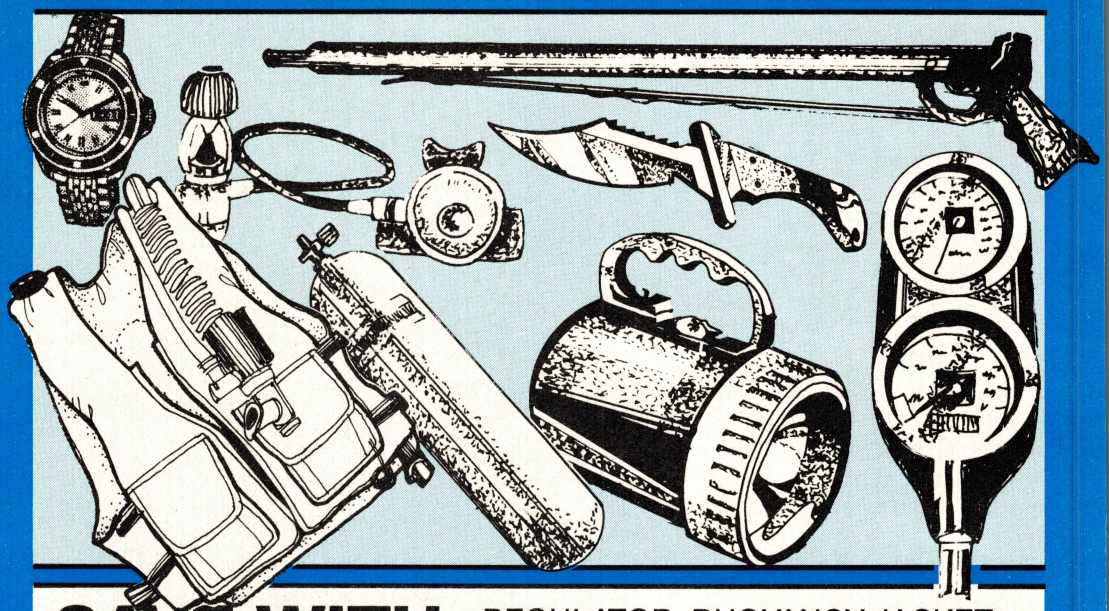
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CRESSI-SUB

Once the rubber compound has been ground and mixed in the Banbury, it is passed along to two other open mixers. These are giant machines with heavy metal cylinders that roll and knead the rubber batch in much the same way bread dough is mixed. More ingredients are mixed into the rubber at this point and finally the coloring is added. The rubber is then passed from the open mixer to the compressing machine. It is placed in a long tube and then compressed by a large ram. This squeezes the air out of the rubber and forces it through an extrusion nozzle. The rubber comes out of this machine in small, dense ingots which are ready for molding.

At this point, the freshly made rubber compounds are quickly transfered to another building containing the molding machines. In this building there is row after row of giant compression molding machines that form and cook the fins. Each machine can make four fins at a time and the process takes 12 minutes.

When the mold is closed the hydraulic ram places it under pressure while heat is applied. The combination of heat and pressure causes the rubber chunks to flow and blend together in the shape of a fin. The fins are removed from the mold and set out to cool before inspection. The excess rubber is trimmed and the fins are inspected again. There are dozens of machines pumping out piping hot fins, like freshly baked cookies, everyday!

Cressi-sub has the capacity for producing several hundred thousand pairs of fins per year in seven different models and a wide variety of sizes. The company has created an entire line of specialized fins for all types of swimming including: surface snorkeling, casual free diving, deep free diving, swim fin racing, sport scuba and professional scuba. The company also produces several hundred thousand facemasks annually, in 15 different designs.

While Cressi-sub may have been an early pioneer in dive equipment manufacturing, it has continued to keep pace with the growth of the sport. Today, it is one of the world's most prolific producers of quality dive equipment.

SWAP MEET DATE

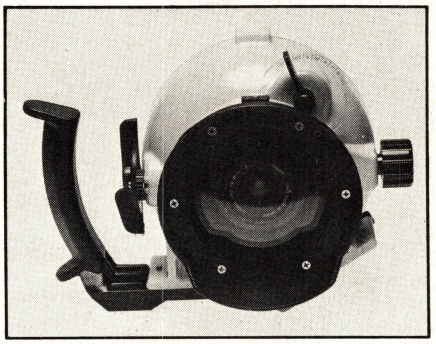
The date has changed for the Santa Ana College Dive Club's Fourth Annual Divers Swap Meet. The event will be held from 9 am to 2 pm on September 11, at the college, 17th and Bristol Sts.

The swap meet is being held on the pool deck at Santa Ana College and the pool will be open to test gear.

For information contact Jim Taylor, 22011-J Rimhurst Dr., El Toro, CA 92630.

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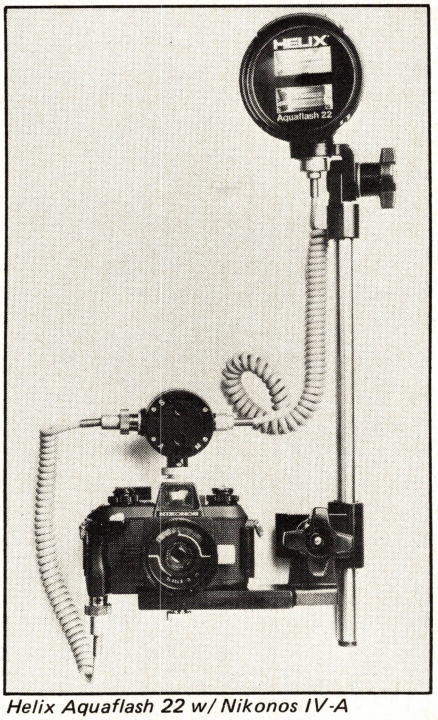
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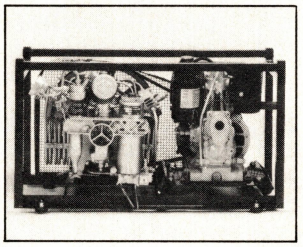
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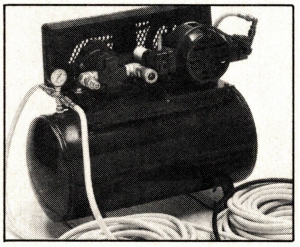
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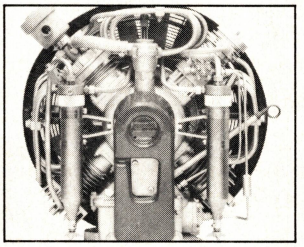
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DIVER OF THE YEAR

The Northeast Area of the Underwater Society of America recently awarded its Diver of the Year to Lee Ward of Neptune, New Jersey. The award was presented during the seventh annual Dive to Adventure symposium and film festival of the Scuba Sport Rites Club held at the State University of New York, Purchase.

The call for nominations for the 1984 awards will be made in September. For information regarding the awards, the Underwater Society of America or the Scuba Sport Rites Club please contact: Armand Zigahn, VP USA, P.O. Box 644, Rye, NY 10580.

KEYS SCOUT FACILITY

The Boy Scouts of America have opened a scuba diving facility in Lower Matecumbe Key at its Florida National High Adventure Base. Employment of a divemaster and three assistants, all certified by PADI, completion of two on-site dive training tanks, and dive boats for open water dives allow expansion of programs already offered at the Florida Keys facility. Now in its eighth season, the base draws about 1500 young people and their adult advisors each year.

Scuba certification by PADI, NAUI and the YMCA will be possible during the eight day programs, which will operate at a maximum of three groups of eight students each. Between 32 and 40 hours of classroom and pool instruction and five open water dives will lead toward both basic and open water certification, according to Sam Wampler, who directs activities at the base. All equipment, housing, meals and instruction are included in the package fee. The program will serve Boy Scouts and Explorers ages 14 through 20 from throughout the nation. Special programs for those already certified will be operated in the Bahamas.

In addition to the dive instruction, participants will be able to use the base's boardsailers, catamarans, motor boats, and small sailboats. A separate sailing program using boats up to 44 feet teaching basic boat handling, cruising and racing will continue to be offered.

For information contact Boy Scouts of America, 1325 Walnut Hill Lane, Irving, TX 75062-1296.

HILTON/NAUI CANADA

NAUI Canada has appointed Nancy Hilton executive director. She began diving in British Columbia in 1975.

Hilton completed her ITC in Freeport, Grand Bahama Island in 1978. Until 1981 she conducted courses from basic through assistant instructor. She has also participated as an evaluator and lecturer at ITCs both in Canada and the U.S.

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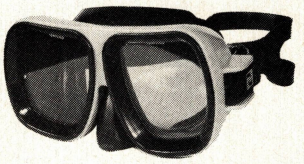
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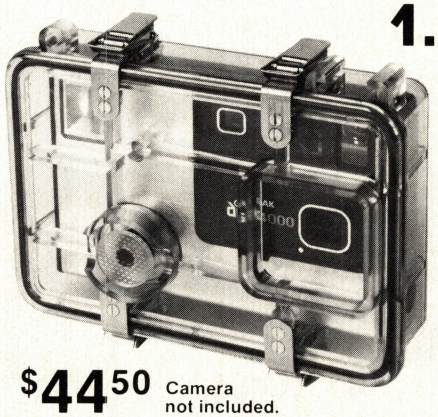
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DIVE FLAG ALERT

The standard red and white dive flag, recognized for years as a caution to boaters, no longer provides any rights or privileges for divers. Federal laws currently require the use of the blue and white international Alpha flag. When diving from



photo/Geri Murphy

a boat, a replica of the Alpha flag, at least one meter in height and visible from all directions, must be displayed. Failure to do so deprives divers of any legal rights or course of action against boaters. The law became effective in inland waters except the Great Lakes on December 24, 1981; in the Great Lakes it became effective March 1, 1983.

This law has always applied for vessels with diving operations underway in international waters. It now applies to inland waters as well. Since federal laws preempt state laws, flag laws will have to be revised to reflect the new specifications.

The new law has created a dilemma. The Alpha flag is needed for legal purposes, but its meaning is not widely known. The traditional flag is recognized, but provides no legal protection. Consequently, it is recommended that divers display both flags until such time as the Alpha flag is effective in meeting its purpose. It should be noted that divers can be cited for failure to display the Alpha flag and that the flag is not flown unless diving operations are in progress.

The Standards Office of the U.S. Coast Guard may be contacted for further information regarding the revised dive flag rules.

DEMA RETAILER COMPETITIONS

Does your dive store or dive club publish a consumer or membership newsletter? If so, your tabloid is eligible to enter DEMA's 1983 Dive Store and Diving Organization Newsletter Awards Competi-

tion. The purpose of the competition is to recognize outstanding consumer and membership publications. Several categories have been designated according to the total annual volume of the entering dive store. Another category recognizes those stores that are publishing a newsletter for the first time. A separate category is for dive organizations entering the competition. Judging will be based on overall excellence, superior content, design, typography, reproduction and printing quality.

DEMA is also sponsoring a Press Kit Utilization Contest. This contest is to provide recognition to those professional dive equipment retailers that best use the DEMA Press Kit. The Grand Prize is a trip for two to the 1984 DEMA Trade Show in New Orleans. Trip includes roundtrip air fare, hotel accommodations and entry fee to the DEMA show and events. Four categories have been designated according to the total annual volume of the entering dive store. Each category includes a first, second and third place prize. First place winners receive VHS video recorders.

For entry forms and more information regarding either the 1983 Dive Store and Diving Organization Newsletter Awards Competition or Press Kit Utilization Contest contact Bob Wohlers at DEMA, P.O. Box 217, Tustin, California 92681.

DINGHY RACE

On July 3, Seagull Marine will sponsor its 11th traditional 4th of July Avon Dinghy Race. The fun begins at 2:00 pm at the Catalina Isthmus, Catalina Island, CA when racers rip off the stowage bags from their deflated Avon Dinghies, pump them up and race off around a buoy. After returning to the beach racers deflate and return their Avons to the bags. Any Avon owner may participate; needed are a duffle bag and Avon bellows.

Cam Smith-Arnold, Seagull Marine race manager, also plans to keep the fun and games going with an Avon tug-o-war and relay races.

For further information and entry form, contact Seagull Marine, 1851 McGaw Avenue, Irvine, CA 92714 or your nearest Avon dealer.

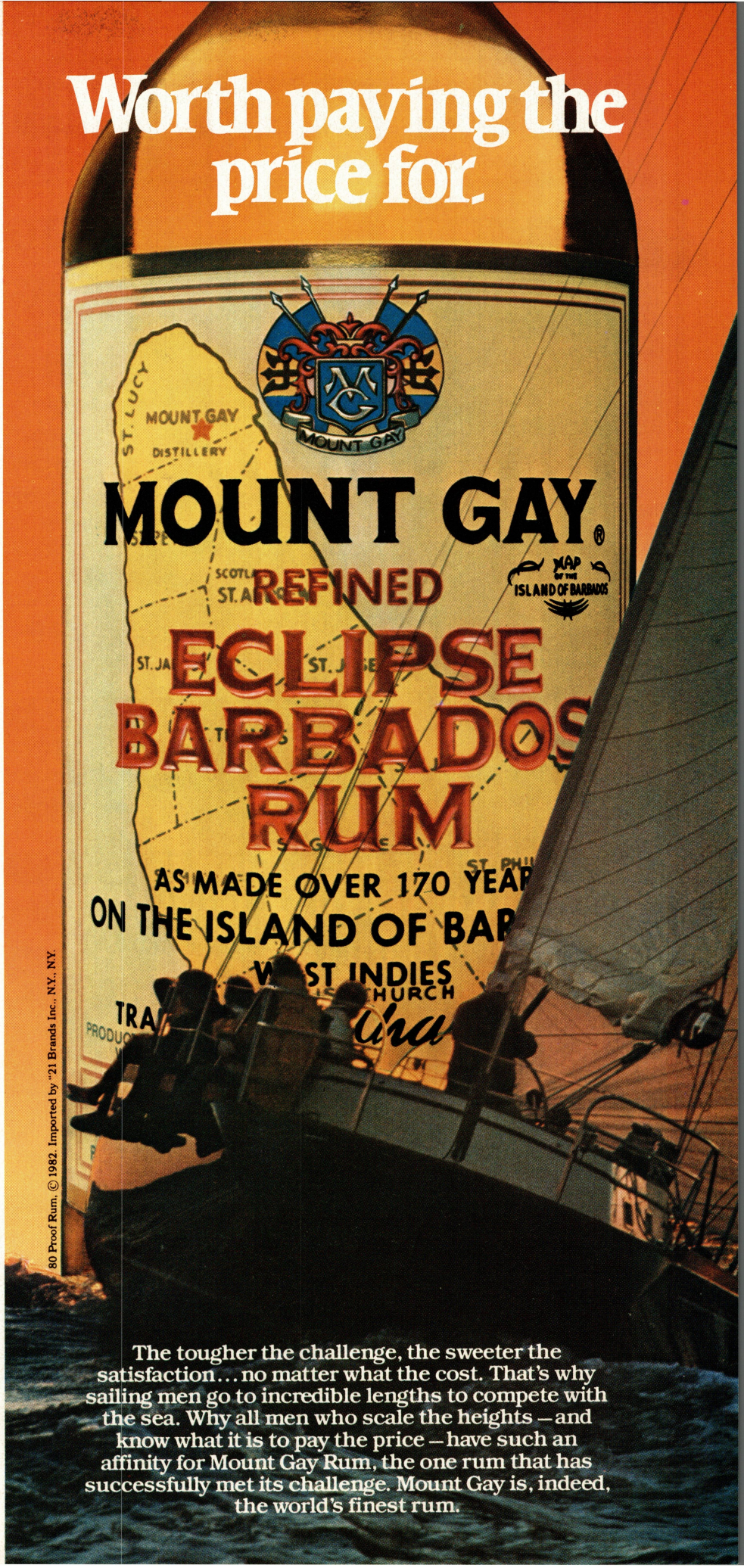
JBL AIDS

JBL Enterprises, Inc. has produced two aids to marketing spearfishing gear.

The Local Marketing Handbook has information on how to display spearguns, how to set up spearfishing courses and on local product mixes.

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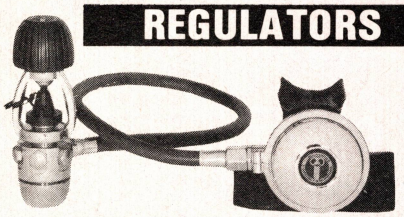
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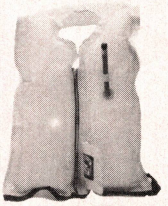
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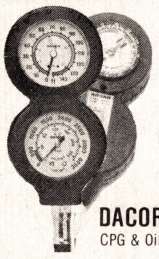


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Cash prizes will be awarded for each of White's 15 distributor regions, including Canada. The contest lasts until August 31. On October 15 White's distributors will have a drawing to give away prizes, ranging from $500 to $25, for their region. You need not be present to win.

NAUI PDC COURSE

The NAUI Professional Development Center of California has a newly expanded professional instructor course. It includes all areas of instruction that a diver needs to become a full time professional dive instructor. Highlighting the course are specialty instruction areas as well as the traditional information covered in such a course.

Among the special topics in which the diver is eligible to acquire teaching expertise are equipment repair, deep diving, rescue diver and search and recovery. In addition, each candidate is enrolled in the store management course and actually participates in a NAUI professional dive store operation.

The professional instructor course is presented in a 10 week session. The next sessions begin July 5 and October 3. For more information, contact Curt Pihl, Director of Student Services, 1706 N. Tustin Ave., Orange, California 92665.

CAYMAN ISLANDS PARTY

This year's annual Cayman Island Party will be held Sept. 16 in the Port Arthur, Texas Civic Center and on Sept. 17 at the Westin Galleria Hotel in Houston.

The party is sponsored by Cayman Airways and Bob Soto's, and will present the Barefoot Man and his band. Also featured will be Harry's Limbo and Fire show, an underwater slide presentation, and an appearance by the Cayman Pirates who annually invade the party and help add to the fun.

For tickets and more information contact: Cayman Islands Party, c/o Cayman Dept. of Tourism, 9999 Richmond, Ave., Suite 131, Houston, Texas 77042.

DAN APPOINTMENT

Chris Wachholz, BSN, has been appointed assistant director at the Center for the National Diving Accident Network at Duke Medical Center, Durham, NC. He will be moving from the Hyperbaric Medicine Department at St. Luke's Hospital, Milwaukee where he has been working with Dr. Eric Kindwall, the regional coordinator for DAN in the Midwest region. Chris, who is 26, has been an avid diver since the age of 14 and is an assistant instructor and certified senior advanced diver and divemaster. He has excellent experience as an intensive care nurse in a major trauma emergency room and has worked with dive accident cases at Milwaukee. He is filling a role formerly filled by Dr. Arthur Dick who left to complete his medical education as a neurologist.

DAN also runs tax deductible courses on dive accidents designed for physicians, emergency medical personnel, paramedics and nurses. All proceeds go to support DAN. The next course will be October 15-22 at the Grand Caymanian Holiday Inn and is associated with a diving package through Bob Soto's Diving Ltd. Further details can be obtained from Cindi Easterling, Box 3306, Duke University Medical Center, Durham, NC 27710.

GRAFLEX/SUBSEA

Two of the oldest names in photography, Graflex, Incorporated and Subsea Products, Incorporated have been recently purchased and merged to form the new Graflex/Subsea Corporation.

Larry Salvo is president of the new corporation. He was the director of sales and marketing of the two previous firms.

For many years Graflex has manufactured and distributed portable electronic flash, sheet and roll film holders and studio strobe systems. Subsea has been a leader in underwater electronic flash systems. The Graflex/Subsea Corporation will be in Riviera Beach, Florida.

KEY WEST SCUBA BASH

The Ramada Keys End and Reef Raiders Dive Shop are hosting the first annual Diver's Bash and Pig Roast on Saturday, July 16. The event will offer live entertainment, a barbecue, beer and prize drawings. Prizes inlcude complimentary dive trips, scuba weekend getaways (including meals and lodging), T-shirts and visors, and free Nautilus workouts.

The barbecue only price is $12.95 (children under 12, $6.50) and includes all Saturday festivities. A weekend package is $113.95 and includes barbecue, accommodations for three days/two nights, one day's diving (use of two tanks, backpack and weightbelt), breakfast and lunch, Key West T-shirts, ticket for the Old Town Trolley, and complimentary drink.

For information or reservations contact Ramada Keys End, 3420 N. Roosevelt Blvd., Key West, FL 33040.



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Tekna Pilot Regulator	144.50
Mares Shortie, 22'', Pneumatic Spear Gun	79.95
Special Nylon 2 Wet Suit ¼''	109.50
Watch Band Termometer	8.00
Vented Fins	22.50
Heavy Duty 15x30 Gear Bag	19.50
Seiko Mens Divers Watch, Automatic	119.50
12lb. Weight Belt Set	19.95
Ikelite Underwater Light	19.95
Sherwood Octopus	39.95
Dacor Pacer 900 Regulator	124.95
Fisher MK1 Metal Detector	249.95
U.S.D. 6 LB. Weight Mold	27.50
K80 cu. ft. Alum. Tank	117.95
J80 cu. ft. Alum. Tank	139.95
Dacor WE.24 Speargun, 2 Sling W/Tip	74.95
30 lb. Lift B.C.	59.95
Wenoka Stiletto Knife No. 7782	15.00
Dacor ICL 150 Combo Oil Filled	84.95
Ikelite Pro Compass Oil Filled	19.95
Nikonos IV A w/35MM F2-5 Lens	329.95
15x27 Cordura Gear Bag w/15x24x3 Pocket	59.95
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Parkway F.J. Wet Suit ¼''	149.95
Nikon EM Camera with 50MM F 1.8	149.95
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Tekna T-2700 Combo	98.95
50 Cu. Ft. Alum. Tank with K Valve	99.50
Dacor DM50 Mask	24.95
Dacor UL750 Dive Light	31.50
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Ikelite S.L.R. Housing	239.95
Ikelite 110 Trim Case Housing	44.50
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Pennform Regulator Bag with Padding	15.50
Princeton Bottom Timer No. BT400	54.95
Tekna T-2810 Combo with Knife	138.50
U.S. Divers Master Knife	19.50
Sherwood Twin 50 cu. ft. Alum. Complete	279.95
Aqua Lung Quilted Winter Jackets	49.95
SE 200 Rechargeable Light	59.95
Tekna T-1900 Rechargeable Light 8 Cell	51.95
Poseidon Uni Suit-Complete	554.95
Wenoka Knife No. 8512 9'' Long	29.95
U.S. Divers Soft Pack	41.50
Vivitar 845 Camera and Housing w/viewfinder	111.95
Ladies Seiko Divers Watch, Quartz	154.95
Poseidon Cyklon 300 Regulator	142.50
Sherwood Magnum Regulator	117.50
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U.S. Divers Pro Dry Suit	314.95
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Henderson Dry Suit w/boots No. 2021	359.95
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Sherwood 250 Foot Wrist Depth Gauge	29.95
Dacor DTK Turbo Fins Adjustable Strap	21.50
40 lb. Lift B.C.D.	79.50
Pole Spear 48'' Length with Tip	16.95

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DIVER'S GUIDE TO U/W AMERICA

Divesports Publishing has released *Diver's Guide to Underwater America*, a paperback of 320 pages. Compiled and written by Kate Kelley and John Shobe, the book is based on almost two years' worth of surveys and telephone interviews conducted with more than 400 dive stores nationwide. In addition to covering more than 1000 dive sites, the book features color photographs by Howard Hall, Ed Robinson, Don Peterson, William Roston, and other U/W photographers.

A dive store directory is included to refer the traveling diver to the local professionals for current conditions. Any dive store not listed in the directory can be included in subsequent editions, free of charge, by writing to: Diversports Publishing, SR 2 Box 390, Branson, Missouri 65616.

JONES FILMS

Hardy Jones Productions has released three films in half inch video tape for the home market. These films should be of particular interest to divers.

Five Years With the Dolphins is the story of a group of divers who find and then become friends with a school of free dolphins in the Bahamas.

Miracle of the Mantas is the story of a diver freeing a giant manta ray from entanglement in fishing line. The ray then allows the diver to ride his back across an undersea mountain.

Return of the Great Whales is the story of the return of humpback and blue whales to the waters off San Francisco. These whales were nearly hunted to extinction, but are now returning.

For further information write Hardy Jones Productions, P.O. Box 855, Sausalito, CA 94966.

REMINGTON PROMOTED AT SHERWOOD

William Remington has been promoted to customer service manager at Sherwood Selpac Corporation, Lockport, New York. In his new capacity, Remington will supervise all department activities and handle customer inquiries concerning pricing, delivery, service and traffic. In addition, he will interface with production scheduling, shipping and Sherwood distributors throughout the United States, Canada and other export operations.

Sherwood Selpac, a Hill Acme Company, is one of the nation's leading producers of precision valves and regulators for compressed gas and LP gas control, plus scuba gear for recreational diving.

Phone Central Last!

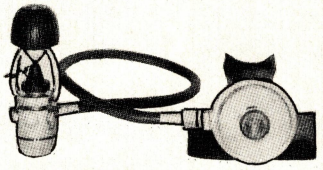
CENTRAL SKINDIVERS is a full time, full line pro shop with an olympic size indoor pool. CENTRAL has been in business 31 years and our sales and service departments are familiar with every Scuba diving item made. If this months specials do not include what you're looking for, call for CENTRAL's discount price on any diving item.

When you've decided what you want to buy, whip out your VISA or MASTERCARD and call CENTRAL at 1-516-826-8888, we'll be happy to take your order for same day shipment. CENTRAL pays shipping in continental USA on most orders.

CENTRAL has advertised and non-advertised specials every month. Send $1.00 for our complete Discount Catalog and Divers Flag Decal.



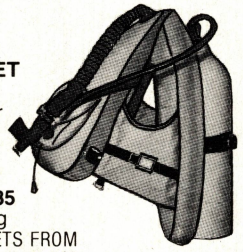
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Lifetime Warrantee
80 Cu. Ft. Aluminum
100% Rust Free
TANK & VALVE $119
Plus Shipping
50 CU. FT., 71.2 CU. FT. AND 94.6 TANKS ALSO ON SALE FROM DACOR AND SHERWOOD.



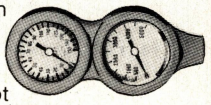
REGULATORS

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TEKNA 2100B	**$140**
DACOR PACER 900	**$125**
SHERWOOD MAGNUM	**$115**
OCTOPUS	**$50**

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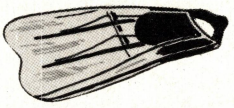


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Velcro Kam Pac
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150' or 250' Depth
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FIN (M or L) $35
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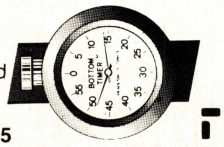


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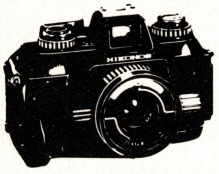


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Nikonos IV-A with 35mm f/2.5 lens	$289.00
Hanimex 35mm Amphibian camera. To 150'- New!	$182.50
Hanimex 110 MF Amphibian camera	$ 94.50
Disk 6/8000 Housing by Aqua-Craft	$ 29.95
Ikelite SLR Super-Eye Case - New!	$237.50
Ikelite SLR Action Finder Case	$199.00
Ikelite SLR Super-Eye Motor Drive Case - New!	$259.95
Ikelite SLR Action Finder Motor Drive Case	$219.95
Tussey T300 Housing w/EO, Sealoc or ICS	$439.95
Oceanic Hydro 35 w/corrected port & EO	$637.50
Creata Strobe CS 56 by Oceanic, arm, tray, Nikonos IV-A connector	$139.95

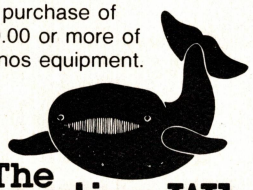
The complete strobe system — Popular Aqua F-1 with modeling light. Includes auto, two manual settings, auto check light, slave, dedication to Nik IV-A, 24mm coverage, f/8 exposure at 3' using ASA 64. With sensor, arm, tray, connector, QXL holder, non-rechargeable QXL light $324.95

Popular Aqua F-1 without modeling light & holder $299.00

Nikonos SB-101 Speedlight w/case and diffuser	$325.00
Oceanic 2001	$299.00
Creata Wide Eye - NEW NIKONOS WIDE LENS ADAPTER	$199.00

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A $19.95 Value SUPER QXL LITE with your purchase of $200.00 or more of Nikonos equipment.



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PDSNY NORTH SEA MODULE

The Professional Diving School of New York, Inc. has completed its first bell diver/saturation training module approved by the Chief Diving Inspectorate, UK.

The ten week program was conducted at the school's North American Hyperbaric Center utilizing its deep ocean bell simulator facility. The simulator permits actual under pressure wet lockouts to be conducted at depth while under direct instructor supervision from within the simulator or via closed circuit television of the bell interior.

Upon completion of the PDSNY module, students move to the Underwater Training Centre, Fort William, Scotland for the final two week training module. While at Fort William, PDSNY students make equipment validation dives on air to 50 metres followed by two mixed gas dives to 75 and 100 metres in order to qualify for bell certificates under the British standard.

For information regarding this certification program contact: Professional Diving School of New York, Inc., 222 Fordham Street, City Island, New York 10464.

VALLANCE NAUI BRANCH MANAGER

Charlie Vallance has been appointed South Atlantic branch manager for the National Association of Underwater Instructors (NAUI) by national training director Walt Hendrick, Sr.

Vallance, department head of Underwater Technology at Florida Institute of Technology, is active in many dive related organizations. He served as chairman of the National Association of Cave Divers board of directors during its reorganization in 1976, and since 1971 has developed training programs at FIT.

SINGAPORE PHOTO COMPETITION

The Singapore branch of the British Sub-Aqua Club, in conjunction with the Photographic Society of Singapore, is sponsoring the Singapore Underwater Photographic Competition/Exhibition 1983. Photos will be judged in three categories: photos taken in Singapore waters by Singapore residents; photos taken in Asian waters by Asian residents; and open to all regardless of where the photo was taken.

The closing date for entries is July 31, and information can be obtained from The British Sub-Aqua Club, Branch 854 Singapore, Room 12, Sports House, Rutland Rd., Singapore 0821, Republic of Singapore.

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Helix, Aqua Flash 22	329.00
Oceanic 2001 Strobe	289.95
Hanimex 35mm Amphibian	CALL FOR QUOTES
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Ikelite Light & Strobe	25% off

DIVING EQUIPMENT	
1081 USD Conshelf XIV Reg.	118.00
1088 USD Conshelf Supr. Reg.	130.00
1099 USD Octopus	58.50
7420 USD Triple Mod. Console	107.50
2100B Tekna Reg.	169.50
2101B Tekna Octopus	79.95
2710 Tekna Combo - max Depth Gauge	93.50
2810 Tekna Combo w/Knife	130.50
Tekna T1100 Silicone Mask	49.95
Tabata TM-2900 Q Mask	29.50
Tabata TR-30 Reg.	139.95
Tabata TDS-703 Dive System	395.00
Tabata SCA-40 Deluxe Console	129.00
Sherwood SRB-3200 Mag. Reg.	99.50
Sherwood SRB-3200 Mag. Bliz Reg.	115.50
Sherwood SRB-Octopus	39.95
Sherwood GC-250 Console	84.95
Princeton Tectonics Console PTC-200	125.00
Princeton Tectonics PTC-300	168.95
Princeton Bottom Timer (High Alt. Adj.)	46.50
Princeton Tectonics DG10	59.50
Princeton Tectonics Pressure gauge PGL	59.50
Barakuda Military Reg. (Reg. $360.00)	NOW 270.00
Oceanic Talon Knife	39.95
Buoyancy Compensator Jackets US Divers, Parkway, Sherwood, Seatec	Call for BEST QUOTES

NEW PRODUCT/MONTHLY SPECIAL	
Swiss made NO Decomp. Decomp. MOS Computer	389.95
New (D.M.P.) 3D Silicone Masks	49.95
Leitz famous pocket Binocular	INQUIRE
Chronosport watches	20% disc
NIMAR U/W CAMERA HOUSING UNIVERSAL	
FIT 3 yr, 300 ft warranty	239.95

We carry – 47 Scuba brands, 10 Infl. Boat brands, 10 Sailboard brands, 15 Camera brands, Super 8 and 16mm Movie & Video Equipment call for any price quotes

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DEALERS INQUIRES INVITED, EXPORT SHIPMENT

Sherwood Selpac Diving System	
Magnum Reg. Soft Pac, Stab. Jacket, 80	440.00
Additional Alum., Tank K-Valve	115.00

$5 dollars handling charge. Layaway. Insurance additional $30 dollars handling charge boats, motors. VISA, MASTERCARD, AMEX. Freight collect. Vender catalogs $1 each.

C-card # requested on life sustaining equipment. Underwater life support systems are potentially dangerous to an untrained user. These items include tanks, regulators and buoyancy compensators. This ad does not necessarily constitute sale of those items through Mail Order.

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Announcing Casio's New Marine Wonder

. . . With 200 meter water-resistance
. . . 7-year battery
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. . . 33 foot drop shock tested
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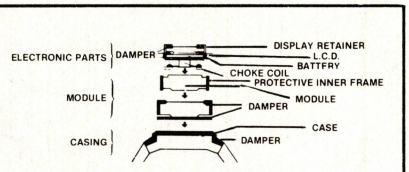
Now there's a timepiece that provides another dimension to marine quartz sportswatch technology. The CASIO **G-FORCE** not only offers you 200 meters of depth-tested protection but can withstand the shock and vibration of a 33 foot drop.

And there's more, much more. . . for much less than you'd expect to pay.

TESTED TO OVER 660 FEET OF WATER, 33 FEET OF SHOCK.

The CASIO **G-FORCE** has been depth-tested to over 660 feet! The special O-ring construction and protective inner frame provide a tight seal which is virtually impervious to water or moisture.

And the **G-FORCE** is almost indestructible. It takes vibration, shock and hard use in stride. You can crash it into a rug-surfaced cement floor from a height of 10 meters (33 feet) with no noticeable effect. Wear it while doing heavy underwater work, exercise or any strenuous activity.



G-FORCE CONSTRUCTION

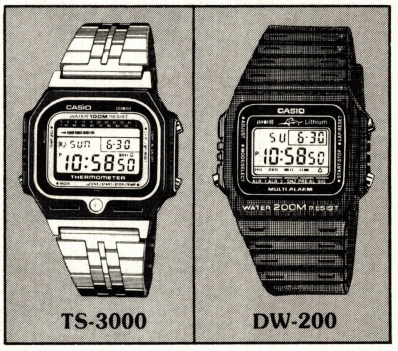
THREE MEMORY ALARMS.

With this CASIO wonder you have three separate, convenient reminder systems. You get not only a daily alarm and an hourly alarm but also a countdown timer alarm which can be set at any position from 1 minute to 12 hours. A professional stopwatch records split times, and 1st-2nd finishes to 1/100 second accuracy. And a "beep" sounds at 10 minute intervals during timing, even under water.

UNIQUE DISPLAY FEATURES, 7-YEAR BATTERY, RUGGED DESIGN.

Another advantage of this unique timepiece is that it keeps a continuous display of the time in all modes no matter what mode is being used. And with the touch of a button you can instantly have 24 hour European/military time. Quartz accuracy to ± 15 seconds per month, night light and 7-year battery top off its list of features.

The **G-FORCE** is constructed of rugged, lightweight black polysulfone for the band and outer frame and stainless steel for the inner frame. It's yours for only **$69.95.** The all-stainless model **DW-1000** and stainless case and resin band model **DW-1000C** are **$69.95** and **$59.95,** respectively. These two quartz beauties offer all the functions of the G-FORCE except 33-foot shock resistancy.



TS-3000 DW-200

TWO OTHER TOP CHOICES

WATERSPORTS/THERMOMETER.

Here's a gifted marine timepiece that gives you an electronic thermometer that reads in or out of water in Celsius and Fahrenheit [-10°C(13°F) to 60°C (140°F)]. It's watertight to over 300 feet and in addition to thermometer function, gives you time and calendar, 12/24 hour formats, thermo-alarm function, daily alarm, time signal, one-hour 1/100 second stopwatch with repeat, 8 world time zones and night light. Available in lightweight black polysulfone model **TS-1000** for **$49.95** or all stainless steel model **TS-3000** for **$79.95.**

200 METER PROTECTION FOR UNDER $40.00.

Here's a 200 meter lightweight black polysulfone diver's alarm-chrono at a "special" light price. You get a professional one-hour 1/100 second stopwatch with repeat, countdown timer alarm, dual time, 12/24 hour time, night light, electronic calendar, 5-year battery and 5 independent daily alarms. The model **DW-200** is only **$39.95**. Order early, at this low price it's sure to be sold quickly.

OUR DOUBLE GUARANTEE, SPEEDY DELIVERY.

First, you get the included one-year warranty. Secondly, we guarantee your satisfaction. If not delighted with your new CASIO, return it in new condition within 30 days for a full refund.

We're proud of our prompt delivery. We almost always have the watch you want in stock, and we generally ship the day we receive your order.

We're as close as your phone. Orders are accepted 24 hours a day, 7 days a week.

Order now and be delighted.

CREDIT CARD HOLDERS ORDER TOLL-FREE TODAY

To order, call toll-free number below, or send a check or money order for the total amount **plus $2.50** for the first watch, $1.00 for each additional watch for shipping and insurance. Add an additional $2.00 for U.P.S. air delivery. ND residents add 4% tax.

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Find out how the PADI system can help you get more out of diving. Contact your local PADI Training Facility. For a list of PADI Training Facilities in your area, or for information on PADI Instructor training, write: PADI, 1243 East Warner Avenue, Santa Ana, CA 92705

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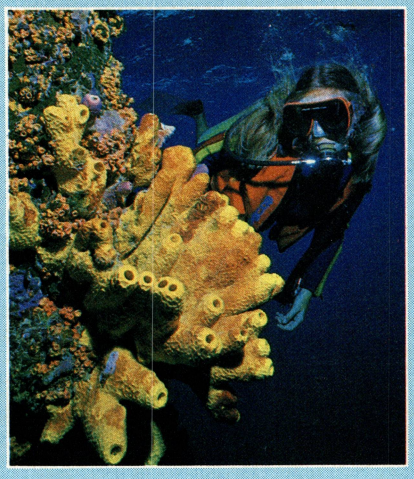
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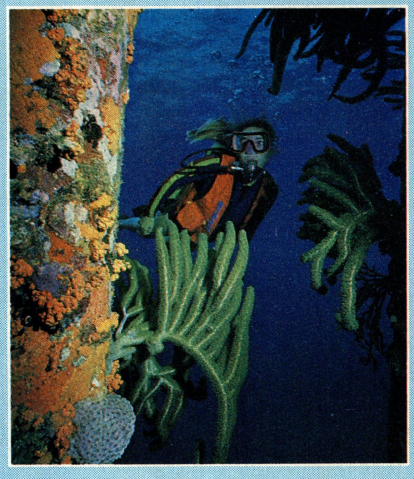
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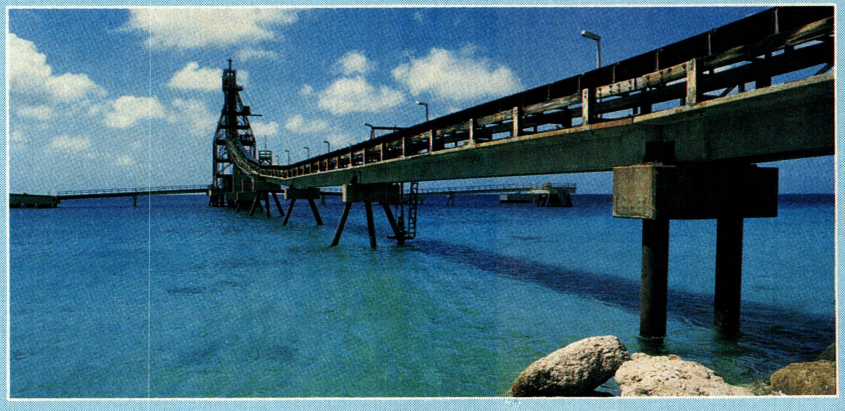
SALT PIER

Bonaire's Newest Dive Site

TEXT AND PHOTOGRAPHY BY GERI MURPHY







Salt Pier is one of the newest and most exciting dive spots on the island of Bonaire. This location has risen rapidly in popularity among visiting divers as it provides an excellent opportunity to view a high concentration of beautiful marine life in one small area.

Salt Pier is approximately four miles south of the town of Kralendijk and the dive resort hotels. It can be dived either from the shore or a boat, but most visitors prefer the ease and convenience of a boat trip.

The pier is actually a modern concrete facility specifically designed for the loading of salt produced at the Solar Salt Works of the Antilles International Salt Company. The mammoth structure juts out from shore almost 1000 feet and is marked by a concrete and steel superstructure which rises 70 feet above the surface. While the pier is an active loading facility, ships are seldom tied up to it for long.

Of particular interest to divers are the tall cylindrical pilings which support the T-shaped structure. The outer pilings rest upon a steeply sloping bottom with depths ranging from 30 feet on the inside of the pilings to 80 feet along the outside edge. The bottom around the pilings is a jumbled mixture of coral heads, tires, construction debris and coral encrusted objects. Some of these provide unique opportunities for underwater pictures: Imagine a scuba diver perched on top of a discarded stepladder!

The best and most beautiful collection of marine life can be found on the sides of the pilings rather than the seafloor. Each piling is a sculptured column of marine life which begins at the very surface and runs down the piling to the seafloor. The marine growth includes a dazzling array of brilliantly colored sponges in yellows, shades of orange, gray and purple. Large portions of the pilings are crowded with yellow and orange flowering *Tubastrea* cup corals. This coral's polyps blossom in the late afternoon and evening hours. The upper portions of the pilings are also adorned by seawhips, encrusting sponges and other forms of marine life.

Salt Pier is a veritable supermarket of small invertebrate creatures which provide hours of delight and fascination for the underwater photographer. Each piling is occupied by a family of arrowcrabs, and literally hundreds of Christmas tree worms in just about ev-

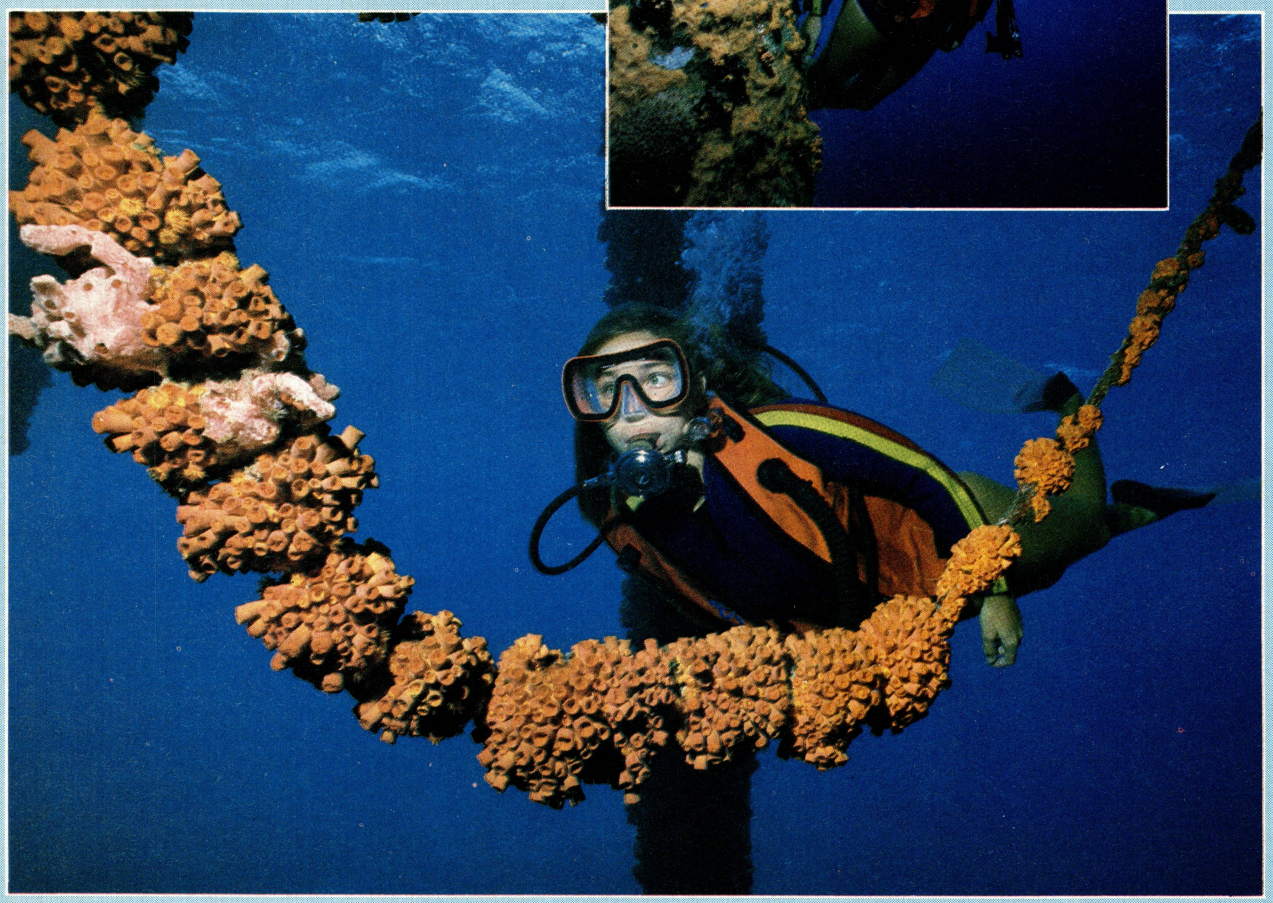
ery color combination imaginable. Other macro creatures include; banded coral shrimp, small crabs and lobsters. Underwater visibility at Salt Pier can range from 40 to 90 feet.

Still another attraction at Salt Pier is the abundant fish life, which includes several unusual species. Upon first approaching the pilings underwater, divers frequently see three or four barracuda suspended among the tall pillars. There is a wide range of coral reef fish that inhabit the area including; four-eyed butterflyfish, angelfish, trunkfish, boxfish, cowfish, etc. Black and white moray eels and goldspot snake eels inhabit the coral heads and debris around the base of the pilings. Slightly rarer species which are often seen at Salt Pier include batfish and frogfish. It is also one of the few dive sites at Bonaire where tarpon have frequently been sighted by divers.

Salt Pier is an excellent location for either daytime or night diving. The best time for daytime visits is in the afternoons when the sunlight is streaming through the pilings creating a cathedral effect.

Divers planning to visit Salt Pier must first make arrangements with their Bonaire dive resort guide as special permission is required from the dockmaster.





Jutting out from shore almost 1000 feet, Salt Pier stands on a bottom sloping down to 80 feet. The pier's pilings support extensive communities of colorful invertebrates including sponges and *Tubastrea* cup corals.



Photograph by Jim and Cathy Church

A fantastic variety of excellent dive sites by day. A fantastic variety of restaurants and clubs by night. For a copy of our 24-page Dive Guide, write: United States Virgin Islands Division of Tourism, P.O. Box 471269, Miami, FL 33152.

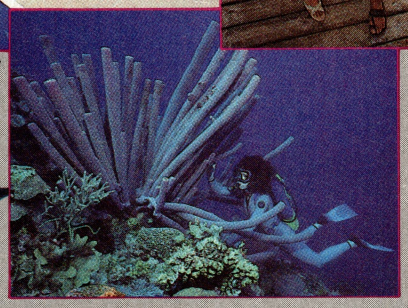
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CATALINA DIVE TOURS

Oceans Unlimited has expanded its worldwide educational and recreational scuba travel services to include two and three day weekend tours to Santa Catalina Island, CA. Small groups depart and return to Dana Point on the mainland on Ocean Unlimited's dive boat, with evening lodgings on the island provided in Avalon. Instruction in open water and advanced open water scuba, underwater photography, and marine biology is available. All tours are guided by scuba instructors and a variety of scuba and underwater photography equipment is available. Tour activities are custom designed for the interests of the individual diver.

For more information contact Ocean Unlimited at P.O. Box 4261, San Clemente, CA 92672.

MAUNA KEA PACKAGE

The Mauna Kea Beach Hotel in South Kohala, Hawaii is offering a special scuba package accommodating both beginning and experienced divers. The hotel's 58 foot catamaran, the *Mauna Kea Kai*, is specifically geared for divers and anchors at reefs that cover a 20 mile area.

A staff of professional scuba instructors supervises small groups and answers questions on local marine life during the daily excursions. Beginners can get their feet wet during a three hour introductory course at the hotel pool before taking the plunge into the ocean.

Guests may explore other activities at the Mauna Kea including: a championship golf course, 13 acre tennis park and jogging trails.

The scuba package is available July 1 to December 18. Based on Modified American Plan accommodations for five days and four nights, it includes an introductory resort scuba course and checkout in the hotel's pool, three morning scuba sails accompanied by certified instructors, two tanks of air, equipment and a sunset cocktail sail.

For more information on the Mauna Kea Beach Hotel, see your travel agent or write General Manager Adi Kohler at Mauna Kea Beach Hotel, P.O. Box 218, Kamuela, Hawaii 96743.

MICRONESIA BOATS

Micronesia Aquatics has completed work on two 22 foot dive/photo boats to be used to explore the sunken ships of Truk Lagoon. Named *Viewfinder* and *Action Finder*, the boats feature large cabins for changing film.

Micronesia Aquatics caters to both individuals and groups and will design a dive program to suit your needs. For information contact Clark or Chineina Graham, Micronesia Aquatics, P.O. Box 57, Truk Lagoon, ECI 96942.

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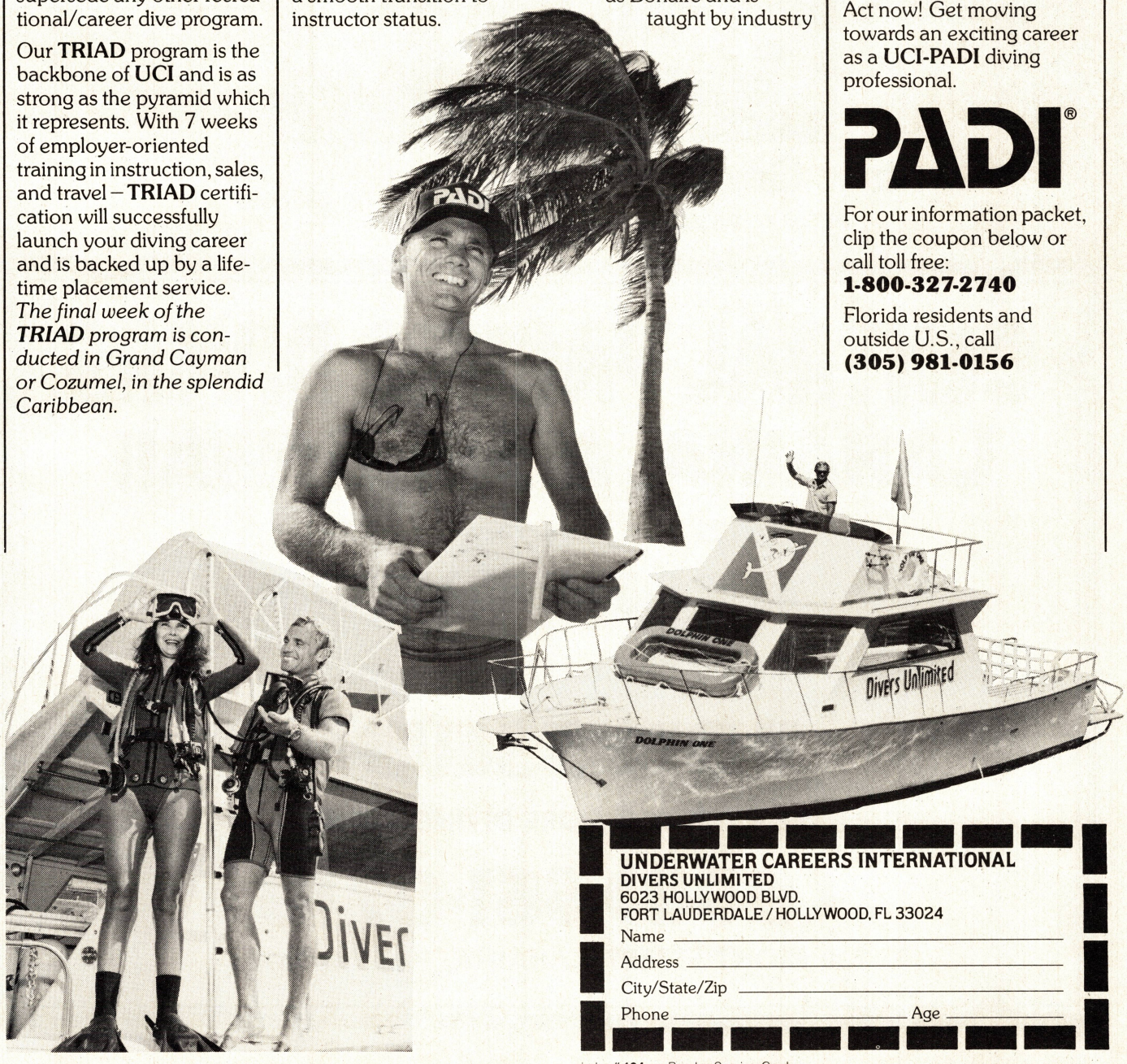
Our **PADI Instructor Training Courses (ITC's)** are a monthly offering which combines our 10 years of educational expertise with the finest diver education program available worldwide. The 2½ day **ITC-PREP** program which precedes each **ITC** will ensure a smooth transition to instructor status.

The **Rick Frehsee School of Underwater Photography** offered 6 times yearly is our off-campus course of continuing education which spotlights the fastest-growing and most popular adjunct to recreational diving. This program is conducted in exciting Caribbean locations such as Bonaire and is taught by industry pro Rick Frehsee and can be combined with our on-campus program leading to **PADI Specialty certification in Underwater Photography.**

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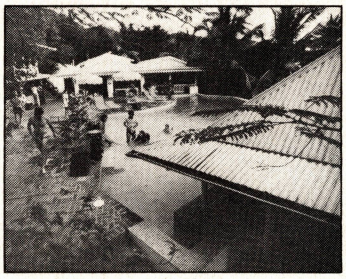
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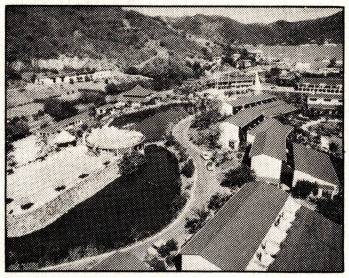
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BACK TO THE RED SEA

A travel itinerary with first class dive vessels to the Red Sea is now available. Amos Nachoum, president of La Mer, who recently returned from an extensive scouting trip to Israel and Egypt, states, "Cooperation between Israel and Egypt has facilitated a vast improvement in the dive opportunities. The condition of the reef's flora and fauna is as healthy, bright and electrifying as it has ever been, and even more so. Our new itinerary along the Sinai Desert and beyond includes the reef of Ras Abu Galum, Tiran Straits, Ras Muhammed and sites that were never before accessible—the wreck of *Don Raven*, Shadwan Islands, the Brothers and others which will offer the best in world-class diving." Nachoum continued, "We have assembled a fleet of modern live-aboard vessels to provide divers with novel opportunities and the maximum in adventure, photography and diving."

For further information and reservations, contact: La Mer Diving Seafari, Inc., 823 UN Plaza, Suite 810, New York, NY 10017.

TORTUGA CLUB

Tortuga Club, Grand Cayman's 14 unit beachfront resort on the island's northeast coast, recently completed another phase of the renovation and expansion program. The main building and units have been repainted, part of the lobby area renovated, and a new water system has been installed.

Paul "Doc" Anes is divemaster/instructor in charge of the dive operation, which offers daily two tank dives on some of the island's most dramatic east coast sites. Full certification and resort courses are available.

Experienced local guide Benjamin Scott will escort anglers seeking bluewater action from marlin, wahoo, dolphin and a variety of tuna.

Sailing enthusiasts can enjoy the club's Sunfish craft in the shallow reef-protected area directly offshore.

Special summer rates are in effect through December 15, and children under 12 stay free in parents' room (maximum two children). All rates are EP, and an MAP supplement is available.

Scuba diving packages featuring eight day/seven night accommodations, daily morning two tank dive, afternoon one tank dive, tanks, backpacks and weight-belts are available. These include round-trip airport transfers; welcome drink on arrival; air-conditioned room with private bath and shower; unlimited use of tennis court, snorkeling gear and bicycles.

For information and reservations, contact: Tortuga Club, P.O. Box 1021, Madison, CT 06443.

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The Package – April 15 - Dec. 15, 1983 • 8 days/7 nights/6 days diving • 6 morning reef trips (2 tanks) • 1 night boat dive • unlimited shore diving • tanks/backpack/weight belt/surface buoy for shore dives included • free Soto T-shirt • welcome cocktail party Tues. night • free admission to the Wreck of the Ten Sails • all the amenities of the Holiday Inn, Grand Cayman • Full American breakfast daily (price excludes tax or gratuities).

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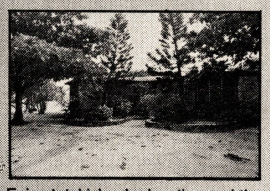
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Little Cayman

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WEEKENDS AWAY TOURS

BWIA International, in conjunction with Weekends Away Travel, is offering eight day/seven night Scuba Tobago dive tours to Tobago through December 15.

The tour includes accommodations at the Crown Reef Hotel; roundtrip airport transfers; breakfast and dinner daily; welcome drink; 12 dives including boat, guide, use of tanks and weights, and unlimited air fills. Also, Sunfish, Windsurfers and paddleboats are available at no additional charge.

Adventures Unlimited of Trinidad and Tobago, Ltd., the dive operation, is run by Wayne and Karen Brown, originally from California. Both are PADI certified dive instructors with prior experience teaching and managing the diving facilities at resorts on Grand Cayman and St. Lucia. Operations include a complete PADI training facility.

The diving facilities are brand new, including the building with room for teaching, repair, maintenance and film processing. Two new boats are available, including a 28 foot Pirogue. New Dacor scuba equipment is also available.

ORKNEY TRIPS

Dive Away, Inc. of Plainfield, NJ is offering a series of summer 1984 diving trips to explore the sunken German fleet at Scapa Flow, in the Orkney Islands of Scotland. The excursions will be leaving in July and September.

On June 21, 1919 the German Navy scuttled 74 ships in Scapa Flow rather than let them fall into the hands of the British. The wrecks include the *Brummer*, *Koln*, *Kronprinz Wilhelm*, *Markgraf*, *Koenig*, *Dresden* and *Karlsruh*.

The Orkney Islands' Council is in the process of establishing an underwater leisure park in the area, putting an end to rumors that the ships would be salvaged.

Information regarding the trips can be obtained from Dive Away, P.O. Box 6261, Plainfield, NJ 07062.

MORE BOTTOM TIME

Bottom Time Enterprises now has the *More Bottom Time*, a new dive boat specializing in overnight package dive trips from Panama City, FL to the Florida Middle Grounds, the *Empire Mica* and many more dive spots.

The *More Bottom Time* is 95 feet long and 22 feet wide. She is complete with the latest in electronics, full galley for regular meals, bunks, air compressor, shower, heating, air conditioning, etc. She is Coast Guard approved for 100 passengers and 100 miles offshore.

Captain Mike and his entire crew are all certified divers. For more information and reservations contact Captain Mike at *Bottom Time* Enterprises, Rt. A Box 564, Youngstown, FL 32466.

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BY DAWN CAHOTY

Since Chicago-based developer Don Dise first pioneered resort development on Grand Cayman's quiet north coast in the 1960s, Cayman Kai has grown to include everything any seasoned island hopper could hope to find—including the out-island atmosphere of a much more remote enclave in the Caribbean. Those expatriates who came and stayed at Cayman Kai were a happy group who achieved what has eluded island transplants in other destinations: They have coexisted in harmony not only with the natural beauty of the environment, but also with the friendly 800 plus native Caymanians in the district.

They built cute cottages, splendid villas with seaside vistas, luxurious condominiums in unique island styles, and a fine full-service resort. The facilities available here are prestigious without being pretentious—a lot like the residents of this community themselves.

Cayman Kai today is easy to reach, far more accessible than a decade ago. Excellent roads on Grand Cayman make the resort a pleasant 45 minute ride from George Town, and the North Sound Ferry which runs regularly throughout the day transports guests, for a small charge, from a departure point near the island's downtown district to Cayman Kai's Water Cay dock.

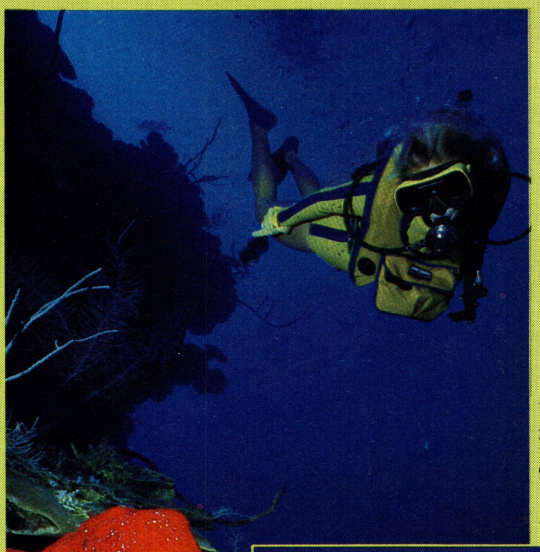
Rewarding those who make this extra travel effort away from Grand Cayman's popular Seven Mile Beach area, is the low key atmosphere of Cayman Kai Resort, the heart of this district's tourism industry.

Cayman Kai Resort is part of the total Cayman Kai community, which includes private homes, rental beach villas, the Island House condominiums and the 26 unit resort itself. It is on 200 beautifully landscaped acres overlooking the north coast reef which begins 175-200

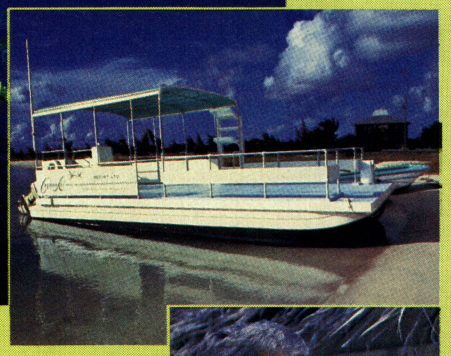
Cayman Kai

country club for scuba divers





photos/Geri Murphy





photos/Dawn Cahoty

Top to bottom: The North Wall of Grand Cayman is noted for growths of bright red sponge; one of the Cayman Kai flattops; John Darby and his pet parrot Pirate; Cayman Kai welcome sign.

yards offshore, providing the year-round lullaby of breakers against stands of elkhorn and staghorn. And just beyond the reef is Cayman's famous North Wall, the setting for some of the Caribbean's finest diving.

Accommodations include 26 one and two bedroom sea lodges, each with complete kitchen, dining area, and screened patio offering easy access to the stretch of reef-protected beach which separates Cayman Kai guests from the dramatic diving just beyond. Just a short distance away are the Island Houses, privately owned two bedroom, two bath, fully equipped condominiums overlooking a sheltered lagoon, available by the day or week. Completing accommodation options are a variety of one to four bedroom luxury beach villas, also a short distance from the resort. All share the Cayman Kai amenities of full service bar, restaurant and Kai-Missary grocery store, open daily.

The resort's seaside patio bar is a popular gathering place for islanders and guests. On weekends, a regular collection of islanders escaping job rigors will quickly tell you: A trip to Cayman Kai is almost as good as (and in some ways better than) a trip off the island for R&R.

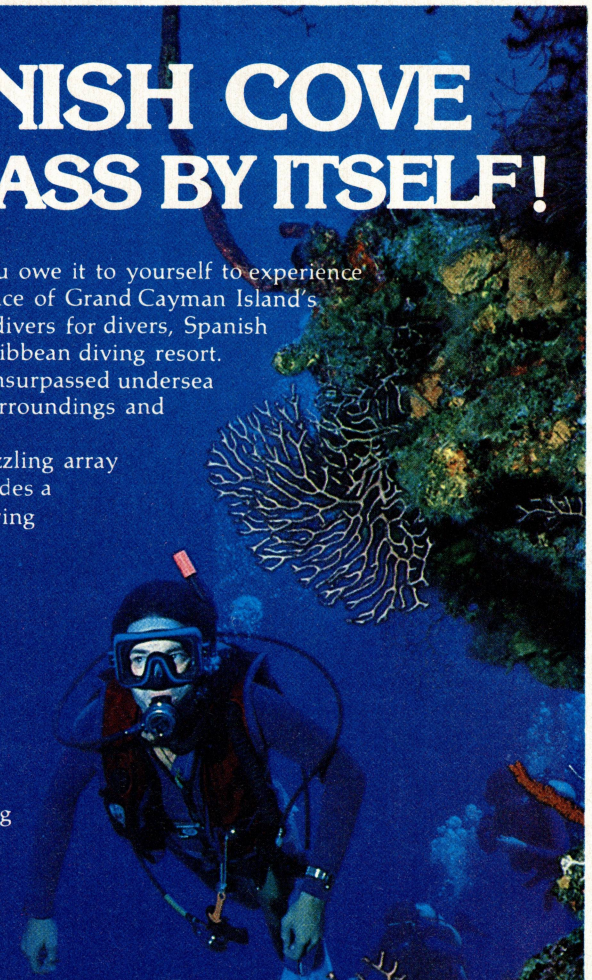
The seaside bar is the daytime social center: During evenings, the Top of the Kai lounge offers an identical high tide of exotic cocktails, with live local entertainment on Wednesday and Saturday above the dining room.

Cayman Kai is currently the only full-service restaurant in the area, but its prices are also some of the most reasonable on the island. Full breakfast, lunch and dinner menus are offered daily, and the resort is famous for its local seafood, prepared by Caymanian Mabel McCoy, who has been at Kai for 15 years. Guests can sample a wide variety of local dishes during their stay, including such delica-

SPANISH COVE
IN A CLASS BY ITSELF!

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CAYMAN KAI

cies as lobster salad, turtleburgers, stewed conch and native-style fish. Each dinner offers one surf and one turf—either seafood or a traditional continental entree like standing rib or strip steak. The dinner prices begin at $9.50, and the most expensive entree is $12.50.

On Thursday evening, a chicken and rib barbecue buffet is followed by an underwater slide show produced by Cayman Kai divemasters. Other entertainment takes place daily in the form of lively, animated, and often hilarious conversations with Cayman Kai managers John and Lee Claypool and assistant manager John Darby. The congenial caretakers of Kai guests can provide hours of tales from Cayman's coconut telegraph, told without a trace of cynicism, regaling guests with a roster of Ripley's recollections of their years in the islands.

Cayman Kai is not, its managers quickly emphasize, a divers' resort, but a refuge for all travelers who savor a laid-back, out-island ambience. It just happens to be within minutes of some of the most dramatic wall diving and interesting shallow reef formations in the Caribbean.

For those not aquatically inclined, tennis, bicycles, rental cars and shaded beachfront hammocks are available.

But, waterbugs will find everything they could want to occupy their daylight hours. Directly offshore, excellent snorkeling exists in the reef-protected shallows, offering a fine primer on Caribbean marine life for beginners and entertainment even for experienced snorkelers. Within the 200 yard distance to the reef, elkhorn stands, a variety of tropicals and a passing parade of reef creatures exists in 10-12 feet of water.

One of the Kai's most popular diversions is a picnic snorkeling trip to a reef site acclaimed by islanders as one of the finest on Cayman. The trip costs $25 and offers five hours of combined snorkeling, boat ride, and beach picnic offering a true Cayman-style repast of fish and local vegetables. Guiding guests through this enjoyable experience is another longtime Kai employee, boatmaster Robert Whittaker, a Caymanian seaman who has been with the resort 15 years.

Other watersports available include sailing on the resort's four 13 foot Sunfish, boardsailing, waterskiing or use of the Pelican paddleboat.

Those who do come to Cayman Kai to dive include some very seasoned travelers from the U.S. and Canada. Cayman's famous North Wall is Cayman Kai's home surf almost year-round, and the resort's dive shop is on the premises. Facilities include a Worthington 15 compressor and a Mako 14 both with storage systems; 50 aluminum 80 tanks and rental scuba gear

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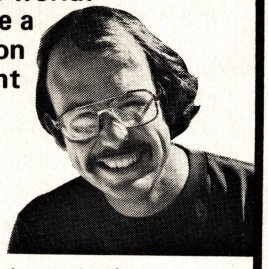
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CAYMAN KAI

(for resort guests on supervised dives with the operation only).

The Kai fleet includes a 36 foot Bristol Blue Water flattop (which just went into service in March), able to handle 20 divers, and a 26 foot Bristol Blue Water flattop with a capacity for 16 divers.

The boats are moored at the Cayman Kai dock in the protected Water Cay section of North Side, a short three minute ride away by van. The dive sites regularly visited are between 10 and 30 minutes from the dock.

Overseeing the Kai dive operation is assistant manager John Darby, a veteran of eight years in Grand Cayman's dive industry, now beginning his sixth year with Cayman Kai. John, a PADI open water instructor, is assisted by divemasters Russ Coffin and Dale Sanders in guiding guests through an estimated 10 miles of virgin territory on the north coast.

The Kai dive experience is that elusive excursion into primarily unexplored waters, where the diver never knows what itinerant pelagics and reef dwellers might pass through and there is rarely another dive boat in sight when you surface. There's a sense of adventure and mystery permeating this part of Grand Cayman, but one secured by the pronounced safety-conscious policies of Kai personnel. Dives are carefully planned, and limited to 90 feet for 25 minutes.

As a safety procedure, all divers begin their stay with a 30-50 foot orientation dive to make sure all equipment is working and any problems will be corrected which might interfere with enjoyment of the dramatic wall dives in that area.

The day's diving here is one tank at a time. Darby explains that this is what, in his six years at Cayman Kai, most guests want. The morning and afternoon one tank dives ensure a relaxing day, with ample time for guests with non-diving family members to enjoy other activities.

The names labeling favorite dive sites between Old Man Bay and Barkers on the north coast are as unusual as the names on wooden signs identifying the private villas along the road to Cayman Kai Resort (Love Ya Blue, a Texan's retreat, Cayman Staid to name a few.)

White Stroke, Donut Hole, Haunted House and Queen's Throne were sites posted on the weekly dive schedule hanging on the dive shop wall for a typical April program this particular week. No shore diving is conducted from Cayman Kai, and Darby explained that the fringing reef is too difficult to bypass on a shore dive, especially during low tide. Dives are limited to boat trips, with the morning dive a 90 foot maximum wall dive and the afternoon dive on a 30-55 foot site.

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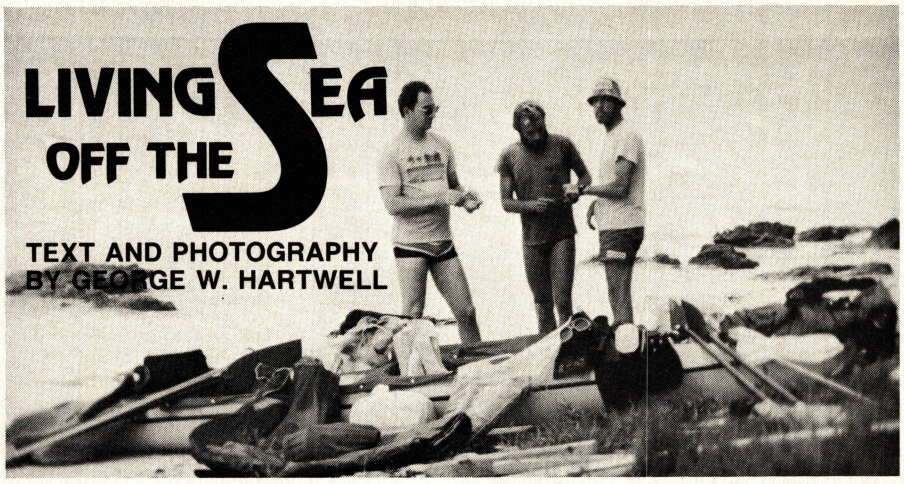
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LIVING SEA OFF THE



TEXT AND PHOTOGRAPHY BY GEORGE W. HARTWELL

Told my friend I had tendrils of smilac and he started itching as though it were contagious.

"Uh, uh, it's good for you," I protested. He still looked uncomfortable.

"Had salt worts, too," I tried to explain. It was apparent the conversation was going nowhere, I thought. He muttered something about "too deep, too long."

Both of these items were among the edible, vegetarian delicacies gleaned from a seashore during a 40 mile, five day adventure traveler's survival tour along the southern shore of Grand Bahama Island. It has been dubbed Living off the Sea by its creator, the Underwater Explorer's Society (UNEXSO) of Freeport, Bahamas.

The camp pots held other delicacies.

"Look at that lobster," guide John Brooks had implored. He lifted the tip of his spear out of the water. A full, five pounds of spiny lobster slapped its tail vigorously against the spear shaft.

The coral head had seemed alive with them. Antennae protruded from nearly every hole and pocket. We took only enough to feed four people as-much-as-you-can-possibly-eat and still have enough left over for lunch the next day.

Grouper breakfasts and triggerfish dinners complemented with exotic wild herb teas added a new dimension to my understanding of "marine survival."

John Englander, UNEXSO president, explained the trip by kayak was patterned after the Outward Bound program of survival training courses offered in the U.S.

"We wanted to give people a vacation experience where they can do and learn things," he said. "The possibility of having such a course adapted to the Bahamas in marine survival appealed to us."

It's not for everyone.

"A little bit of pain is good for you," Brooks intoned, solemnly. I thought both arms would fall from their sockets at that very moment.

"We've only got a few more miles to go," he promised.

Mechanically, I lifted the paddle blade from the starboard side of the kayak and plunged the opposite one into the water on the port side. Seemingly imperceptibly the small boat skidded ahead of the following sea toward an unseen beachhead somewhere on the horizon.

Living off the Sea accommodates a maximum of five students, men and women, in each of its every other month outings. It's not entirely without risk by reason of its definition. And, it may be rough going. The physical demands of paddling long distances and the requirement each member of the group spear fish for dinner limits participation to those in reasonably good health and condition.

By the time the first lobster found itself impaled on my spear I'd paddled 14 miles on a wind-swept, open ocean; slept two nights in a clammy sleeping bag;

(Continued on Page 133)



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CAYMAN KAI

yond the reef, and its awesome fusion of a variety of hard corals peaks between 60 and 50 feet from the surface. During a week of diving at Cayman Kai, you're likely to experience canyons, pinnacles, sand chutes and eerie undercuts covered with gorgonians and populated by Bermuda chubs and ocean triggers.

A 15 minute ride from the dock is one of Kai divemasters' favorite sites, Andy's Wall. Here, the drop-off begins at 55 feet and falls away to reveal an unusual coral arcade at 90 feet. Its sides are decorated with colorful encrusting sponges and deepwater gorgonians—the main thoroughfare for large schools of sennets and other schooling fish. Small wahoo cruise through the seaspace beyond the wall, and Darby said from time to time this site is visited by green turtles, spotted eagle rays and grouper over 100 pounds.

An unexpected quantity of flower coral flourishes atop this arcade, and the top of the wall is home for clouds of tropicals.

Darby feels that almost anything a diver wants to see exists out here. He is particularly sensitive to the desires of underwater photographers and has located several sites with thriving macro communities whose shallow location provides maximum bottom time. White Stroke is one of these—a marine museum of miniatures in 30-50 feet which looks almost like a desert during descent, owing to the vivid sand bottom. But up close, a startling collection of coral clusters and tiny sponges is revealed.

Pinnacle One and Pinnacle Two are other exciting shallow dives and a 30-50 foot festival for macro photographers. A common residential community for a variety of eels and often nudibranchs exists on a shelf 250 yards from the wall, thriving in huge coral heads. You can dedicate an entire dive to a small area—usually within 100 feet of the boat.

Those who visit Cayman Kai might find it difficult to decide which community offers more of what people addicted to small islands want—Kai's congenial, outisland onshore ambience, or its wild, unspoiled offshore attractions.

Whatever you may be told about Cayman's quiet north coast, believe only the best about this very accessible remote resort area. Wet or dry, you'll find Cayman Kai a memorable experience. And, getting there is no problem. Once you step off the Cayman Airways 727, a courtesy van will be waiting to chauffer you north. You might find yourself another visitor who Cayman Staid at Cayman Kai.

For information contact Cayman Kai Resort Ltd. Box 1112, Grand Cayman, BWI; telephone (809) 947-9556 or U.S. reservations, (800) 323-7600—or write Hotel Plans 1200 Harger Road, Oak Brook, IL 60521.

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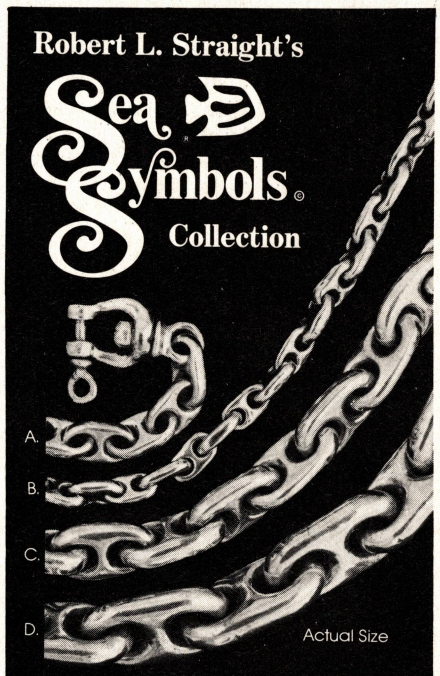
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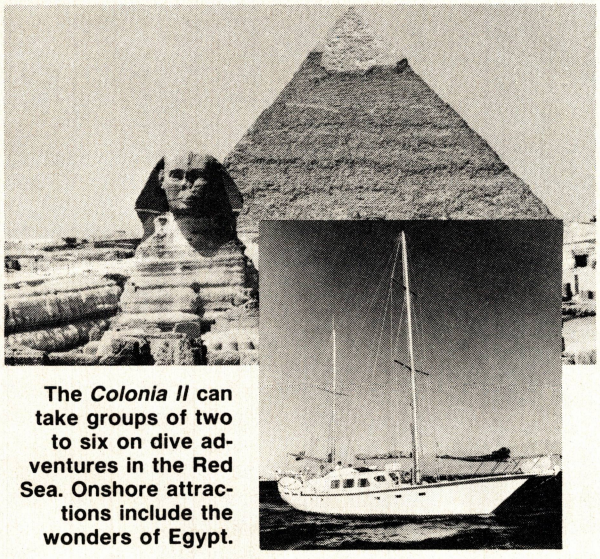
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Cruising The Red Sea

TEXT AND PHOTOGRAPHY BY CARL ROESSLER

The long hiatus which has kept American divers from enjoying the fabled reefs of the Sinai is over. Those of you who have longed to dive and photograph Ras Muhammed, the Temple, Jackson Reef and the *Dunraven* wreck can now reach them in ways not possible before.

See & Sea Travel of San Francisco now offers groups of two to six their own private 60 foot motor sailer. This personalized dive/sail adventure opens an entirely new dimension in Red Sea diving. You don't need a big group, you don't need to stay in a hotel; you can stay at the greatest Red Sea reefs and dive your heads off.



The *Colonia II* can take groups of two to six on dive adventures in the Red Sea. Onshore attractions include the wonders of Egypt.

One unique feature of these new programs is that *Colona II* is the only live-aboard program based in Sharm el-Shiekh. Other boats may have to travel hundreds of miles to reach these reefs, but for *Colona II* they're home port. Besides saving lots of time, some rough cruises up and down that sometimes wind-swept coast are avoided.

As for the diving, what more can one say? The Red Sea's greatest reefs are open again! The great Napoleon wrasse is still at Ras Muhammed, along with the wreck of the *Jolanda*, the great schools of jacks, snappers and barracuda and even the occasional whale shark.

At Jackson Reef the schools of hammerheads, the giant grouper, the turtles and the rays still snatch your attention from the opulent carpet of corals that gleam in the sun like Elysian Fields.

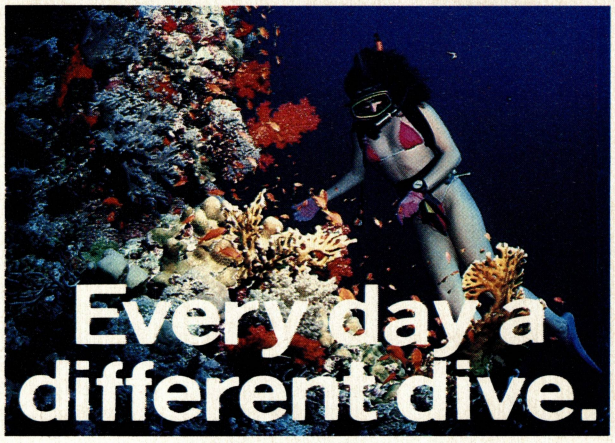
At the Amphora Wreck you can still find the mercury in puddles in the coral and the huge amphorae still dwarf our divers.

At the Temple, the big blue map angel still pesters our divers, and at Ras um Sidd the colossal fans still reach out into the current.

Well then, aside from the personalized, small group format, what's new about these programs?

I thought you'd never ask.

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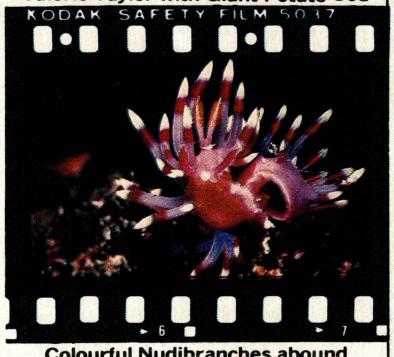
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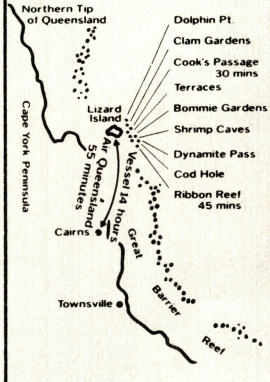
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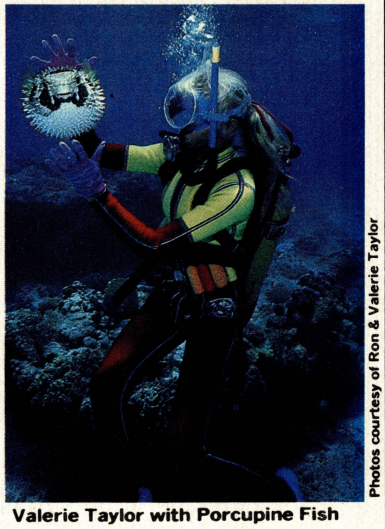


Valerie Taylor with Giant Potato Cod



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Valerie Taylor with Porcupine Fish

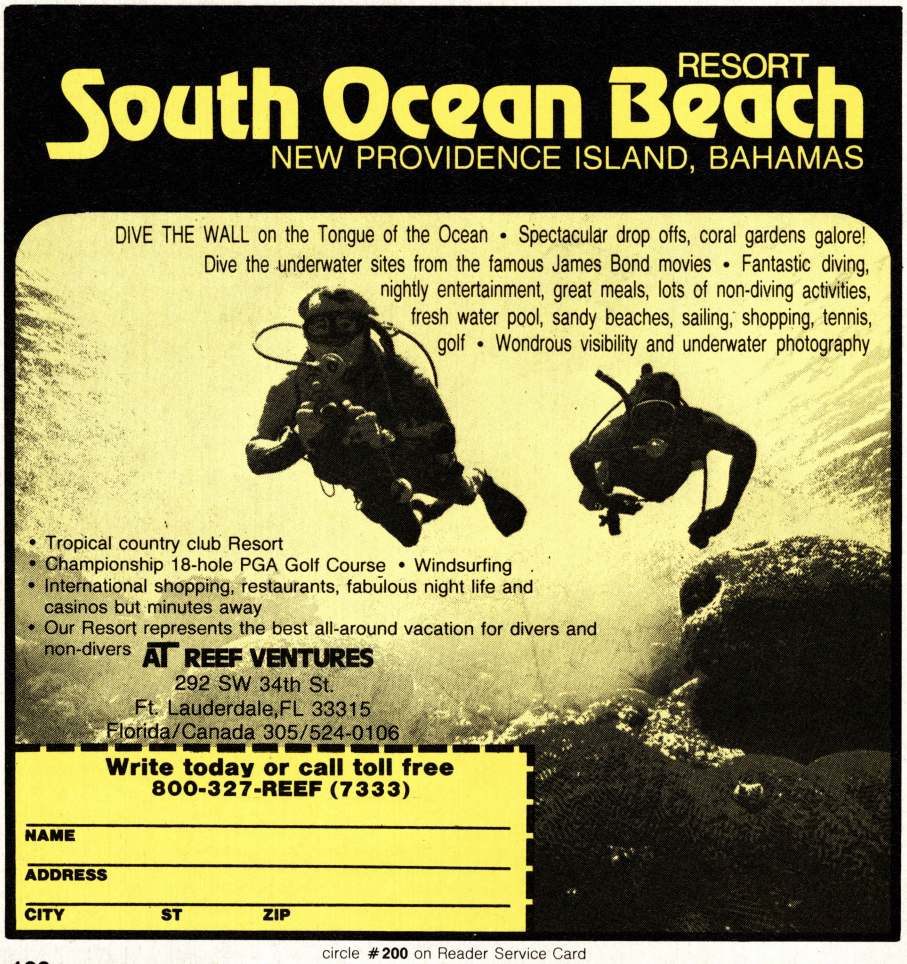
Photos courtesy of Ron & Valerie Taylor

Lizard Island.
Great Barrier Reef, Australia

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RED SEA

Amon's tomb in the Valley of the Kings and, as they say, etc. You could spend a month in these ancient sites and your eyes would still be glassy. Jessica and I recently concluded a one-week whirlwind version that left us gasping.

The first sight of the pyramids towering above the nearby suburbs is a moment of awe unlike anything in my travels. The sheer fact that the Pyramid of Cheops contains 7.5 million tons of stone block which was brought from Aswan defies our imagination. Add to this that it was accomplished 2500 years before Christ and you have begun to assimilate only the first of Egypt's wonders.

The basic program will include ten days of unlimited diving in a total of 16 days including air travel. I'd heartily recommend at least a week of extra time in Egypt; the minimum cruise on the Nile is five days in length.

For me it is a personal pleasure to inaugurate these programs. For one thing, they return to some of the world's most justly famous reefs. For another, they are executive cruises—personalized for small groups of discerning travelers. Thirdly, they finally offer the avid diver/photographer ample opportunity to dive. Finally, I can think of no more spectacular adjunct to a perfect dive cruise than the marvels of ancient Egypt.

Nor will our Red Sea adventures end with the famous reefs of the Sinai. Once or twice each year by special arrangement we'll rendezvous with *Colona II* in Port Sudan, in the Southern Red Sea. Here we'll spend two weeks diving fabulous Sanganeb Reef, explore the vast fish filled wreck of the *Umbria* in crystal water—and even dive Starfish House, Jacques Cousteau's famous undersea habitat featured in his movie *World Without Sun*.

For further information, group charter arrangements and prices, contact See & Sea Travel, Inc., at 680 Beach Street, Suite 340/Wharfside, San Francisco, California 94109.

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Kimm A. Stabelfeldt, author of *Explore Wisconsin Shipwrecks* and *Wreck Divers Handbook*, has opened his own publishing company and the Great Lakes Book Store, providing over 50 Great Lakes books and charts. Great Lakes writers are invited to submit book manuscripts for review and possible publication.

For a brochure on the books available or to submit a manuscript contact: Stabelfeldt Publications, 7844 St. Anne Ct., Wauwatosa, WI 53213.

GAME COLLECTING

(Continued from Page 36)

state fish and game departments. These are invaluable and usually inexpensive. It is extremely useful to know, for example, that halibut hide on sandy bottoms and lobster frequent rocky areas. Certain fish are found at certain depths. Looking at photographs of your particular seafood objective underwater in its natural surroundings is a great help. Most new divers are unable to "see" abalone or scallops at first because the animals match their environments so well.

Once you know what you're looking for and where to look for it, observe the person who is most successful in bringing that game back to the beach or boat. Most experienced divers love to share their collecting techniques. Some will even allow you to come along and watch if you can convince them you won't interfere and won't be in the way. I have found spearfishermen, as well as abalone and scallop collectors, to be extremely helpful. Good bug catchers, on the other hand, will rarely tolerate underwater tagalongs: You might grab a bug before they got to it. They will tell you everything you wanted to know about the subject topside, however!

Most game collecting requires a minimum of equipment and this is relatively inexpensive. You will need a game bag or two. If you hope to catch big lobster, choose one with a wide opening. You should be able to attach the bag to your weightbelt so both hands are free if necessary. A small lift bag or old BC that still inflates is a great idea if your objective (say, scallops) is heavy. If you are going to be taking things on which there are size limits you will need something to measure them with. This is usually spelled out in fish and game regulations. For instance, specific gauges are made and required to be in your possession when you are taking abalone and lobster in California. You must use an ab iron, not a knife, to take abalone and that ab iron must conform to specifications found in the fish and game regulations. If you plan to take fish on which there is a size limit, find a way to mark you polespear or gun so you have a reference. Game wardens are an unsympathetic lot (perhaps because they've already heard every excuse known to man before they hear yours) and I have seen them confiscate fish that were only an inch short.

Don't carry heavy gauges, ab irons and knives in your game bag—they will rip holes in it. Wear your knife in a sheath and attach those other items to the handle of your game bag or have special pockets made for them on your wet or drysuit. By the way, ab irons, especially the stainless steel ones, are wonderful

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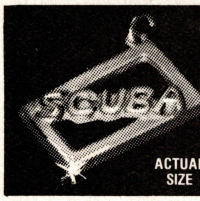
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GAME COLLECTING

tools. Other than being used for abalone, they can also be used to chip scallops off rocks; poke into crevices; move sea urchins out of the way; dig in sand, etc. Until I took up photography, and ran out of hands, I carried mine in Hawaiian and Virgin Islands waters.

Whole books have been written on spearfishing and we cannot attempt to cover it here. Most divers start with a polespear and graduate to a gun. Spearfishermen are usually happy to expound upon the virtues of their particular equipment and give you some helpful hints on techniques as well. When you are ready to purchase a gun, look through old copies of SDM. We've published roundups featuring all the rubber band and pneumatic guns on the market. (Rubber band guns were featured in July, 1980 and pneumatic guns in September, 1979.) While all of the models pictured may not be available today, the articles will show you what types of guns are sold and give you some basic tips on choosing one. A note of caution: Some fish in some areas of the world are poisonous. This toxin is not destroyed by cooking and can be fatal. Also, some fish are just not tasty. Before you shoot anything, find out from local fishermen what's good and what isn't.

Fish and game regulations can be very complicated for some species, but there are always reasons for these laws, usually based on marine biology. Earl Ebert, senior marine biologist for California Fish and Game's Marine Culture Laboratory (they grow tens of thousands of abalone there), explained why some of the department's laws exist. For example, abalone season is closed for two months of the year to relieve pressure on the abalone population by sport and commercial divers. Certain areas along the coast and some Channel Islands are closed all year-round. This is to allow the ab populations in those places to regenerate. Not only is it illegal to take any abalone from these areas, it also defeats the purpose of the closure.

Also, Ebert said the rules regarding the kind of object used to collect this shellfish were developed because abalone lack clotting mechanisms. Almost any cut, especially if it is near the center of the foot, is fatal. And, even if the cut is slight, the abalone's life juices seep into the surrounding waters, attracting predators. Short abalone must be replaced, by law, on the rock from where they were detached. This is because unattached abalone are easy prey for a number of other animals. And, the spot on which they spend most of their time has been cleared of marine growth so they can cling to it tightly.

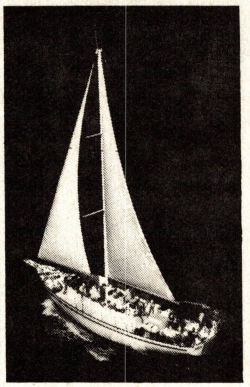
There are many things that are edible in the sea and many of them not only exist in great abundance but are rarely taken by divers. When was the last time you saw a diver with a goodie bag full of sea cucumbers, mussels or barnacles? (These latter taste like crab—a not so distant cousin.) Often there are no limits or seasons on these creatures. Except, that is, on the filter feeders such as mussels. These bivalves are unsafe to eat at certain times of the year because they concentrate a toxin, from the plankton on which they feed, in their bodies that cannot be destroyed by cooking. On the West Coast, mussels and certain other filter feeders are quarantined from May 1 to October 31. Other filter feeders, such as scallops, may be eaten, but the dark parts of the animal should be discarded and only the firm white meat eaten. Find out what is quarantined and when in your area. (Fish and game and state health departments can tell you.)

Once you've got your game on the beach or boat, you must find a way to keep it fresh. Dead seafood deteriorates rapidly and eating spoiled game can make you very ill. If you're on a boat, take a long piece of sturdy line with a brass clip on the end and hang your catch overboard in an extra game bag. (You'll have to bring it up on the deck when the boat is underway.) Or, keep your catch in a big bucket and change the water frequently. A gunny sack placed over the game and watered down frequently works well also. (Try to keep all game in the shade.) A cooler filled with ice is good way for beach divers to keep game fresh, but if you want to bring one on a boat, check first. Some boats do not allow ice chests on board.

Although it would be convenient to clean your catch on the boat on the way home, fish and game regulations do not always allow this. In California, lobster and abalone must be brought to the dock whole, so their sizes can be easily determined should a warden appear. Some fish may be gutted, but not filleted, again, so the size can be determined. Some fish may not be skinned, so the species is readily apparent. Once you are home, however, clean your game and refrigerate it as soon as possible.

Cleaning and cooking game is a specialized art and you will need either a good book, tutoring from experienced divers, or both. Fish and game departments, dive stores and instructor organizations carry books that will help. If you can find a copy of the 1975 book, *The Edible Sea*, you will have recipes as well as collecting and cleaning hints for almost any sea creature you care to capture. The book was written by Paul and Mavis Hill and published by A.S. Barnes and Company.

Game collecting can be a satisfying, rewarding underwater hobby. Good luck, and, *bon appetit!*



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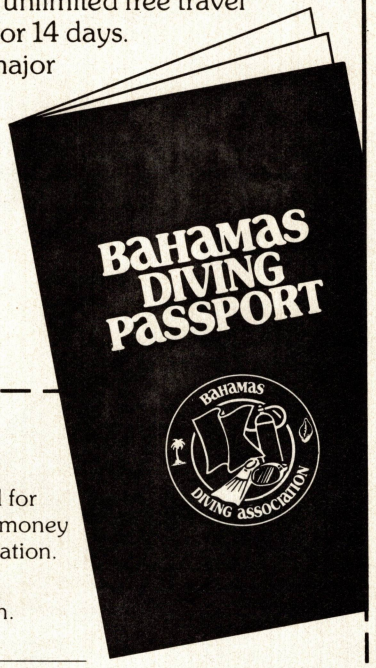
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OceanQuest's staff can answer diver questions and make immediate land and airline reservations. Travel agencies and dive stores are commissionable on all land and dive packages for both individuals and groups. All travel arrangements may be charged on credit card. For toll-free OceanQuest reservations call (800) 526-1394 or in New Jersey/Canada call collect (201) 744-5254.

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Recently David B. Melville and staff welcomed the Rt. Honourable Sir Lyndon Pindling, M.P., Prime Minister of the Bahamas, five cabinet members, several members of Parliament, and other distinguished guests of the Bahamas government to the Grand Opening of Rum Cay Diving Club, Ltd.'s new facilities. The expansive new clubhouse has an indoor bar, lounge, television lounge, video game area, dance floor, outdoor covered terrace and outdoor bar. Each of the three new living units has four large bedrooms. The rooms have two large double beds, table and chairs, photo nook, private bath and terrace overlooking the ocean. There is also a new photo classroom.

For further information and reservations contact, Rum Cay Diving Club, Ltd., 30 Colpitts Road, Weston, Massachusetts 02193.

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ice, passengers should contact either their travel agent or Cayman Airways reservations for confirmation.

Cayman Airways also recently initiated DC-6A cargo service between Miami and Cayman Brac. The weekly service was introduced to help meet the needs of residents in the sister islands.

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John O'Hanlon, president of The Dive Shop, Inc., in St. Louis will sponsor a trip to the Flamingo Beach Hotel, Bonaire, N.A., November 13-20. George R. Schoedinger III, M.D., PADI master scuba diver trainer and orthopedic surgeon will present a medical specialty for sport divers. Divers completing the program will gain additional knowledge of diver's emergency medical problems and earn a PADI specialty rating.

For more information contact The Dive Shop, Inc., 9832 Manchester Road, St. Louis, Missouri 63119.

FIT CARIBBEAN WORKSHOPS

Florida Institute of Technology is offering several Caribbean workshops, "for the diver who wants more than just excellent diving," explains Charlie Vallance, head of the U/W Technology department.

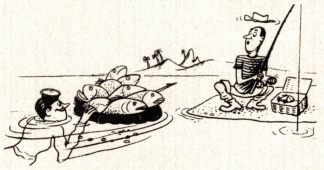
Workshops are planned throughout July with two sections at Grand Cayman and another two in Florida/Bahamas. Participants will earn certification in underwater photography, deep diving and other specialties or enjoy the option of trying commercial dive gear. College credit can be obtained while scuba diving, taking underwater photographs or operating a recompression chamber. On the eight day Grand Cayman trip, divers can choose to live aboard a fully equipped dive vessel, or stay at a modern resort facility. All sections will be limited to ten people to emphasize individualized attention.

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Peter Hughes, known for his successful operation of dive resorts at Anthony's Key and Dive Bonaire, will oversee and coordinate dive operations at the recently renovated Spanish Cove Resort on Grand Cayman.

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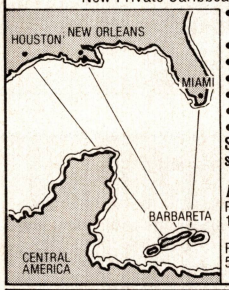
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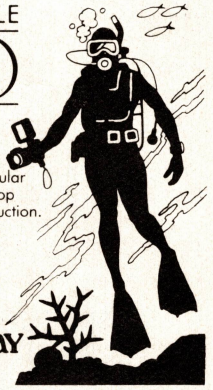
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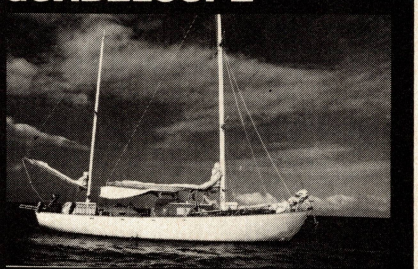
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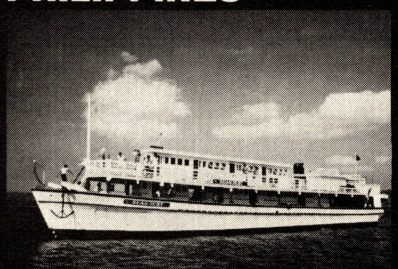
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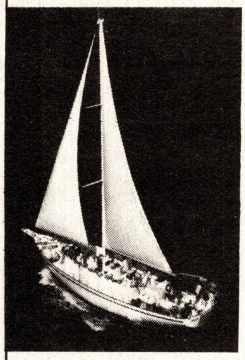
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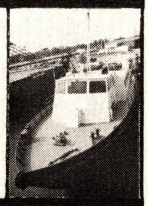
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EYE OF THE SEA

Anthony's Key Resort in Roatan is opening a new underwater photography facility, The Eye of the Sea. The Eye of the Sea's dockside darkroom now provides AKR guests with same day processing of E-6 (Ektachrome) film and overnight service on Ektaflex reversal prints from slides.

The Eye of the Sea also rents Nikonos III and IV-A cameras, as well as strobes, filters and macro lenses. Photo chief John Walch offers classes in both above water and underwater photography. John has been a professional photographer for 15 years. He and his wife, Karen, have published several articles on diving and underwater photography.

To introduce the sevices of The Eye of the Sea, Anthony's Key is sponsoring an underwater photo contest. A free dive vacation at the resort (air fare not included) will be awarded for the best photo taken at Anthony's Key this year. For details, write Anthony's Key Resort, P.O. Box 26556, Minneapolis, MN 55426.

SOTO'S 500 DAYS

Bob Soto's Diving Ltd. of Grand Cayman recently celebrated its 500th day of continuous dive operation. The last day diving was curtailed for any reason according to Ronald Kipp, president and general manager, was when Hurricane Katrina stalled south of Grand Cayman and suspended operations while all area vessels sought safe harbor for four days.

Kipp added, "Our fleet of specially designed boats now numbers five and dive disappointment for any mechanical reason is just not possible."

To emphasize this point, Bob Soto's Diving Ltd. and the Grand Caymanian Holiday Inn offer the first "guaranteed dive vacation." Explains Ron, "If for any reason Bob Soto's can't provide diving, the entire cost covering diving and accommodations is refunded."

For more information about Bob Soto's Diving Ltd. or the guaranteed dive vacation, write airmail to: Ronald Kipp, President, Bob Soto's Diving Ltd., P.O. Box 1801, Grand Cayman, BWI.

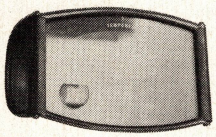
KINGSTON BIGHT LODGE

Kingston Bight Lodge has expanded its facilities and teamed with Brac Aquatics of Cayman Brac to offer a full service dive operation on Little Cayman.

Dive packages at Kingston Bight Lodge include: three meals daily, tanks, weights, etc. for two, one tank dives per day. The lodge is owned by Little Cayman natives, Frankie and Jody Bodden.For further information contact Cayman Adventures, 14 Rochambeau Ave., Ridgefield, CT 06877.

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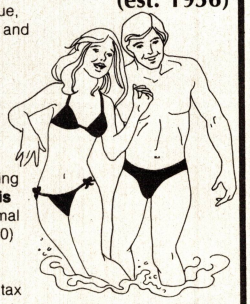
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The kit contains magnifying glass, cement and adequate instructions for the layman.
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PHOTO SEAFARIS

Dave and Gay Woodward have scheduled four dive/photo seafaris for upcoming months:

August 27-September 3—This group will visit the reefs of Grand Cayman and Little Cayman aboard the *Cayman Diver*. Space is limited to 10 persons.

November 5-12—Fourteen berths are available aboard the *Isla Mia* cruising the barrier reef off Belize.

May 15-30, 1984—This group explores the fabulous Red Sea aboard the *Lady Jenny III*. Eight berths are available.

A trip to the Exuma Cays and the remote island of Conception is planned aboard the *Sea Dragon*. Dates have yet to be determined, but the trip will probably occur in June, 1984.

For more information contact Dave and Gay Woodward, 730 Amethyst Drive, P.O. Box 772409, Steamboat Springs, CO 80477.

BONAIRE PHOTO COURSE

Divers Unlimited/Underwater Careers International has set the dates for the Rick Frehsee School of Underwater Photography in Bonaire.

The six day photo course will be offered at the Flamingo Beach Hotel July 16-23, July 23-30, and Sept. 3-10. Dive Bonaire, operated by Peter and Alice Hughes, provides daily E-6 color slide processing as well as a complete inventory of rental photo equipment.

In addition to the standard course curriculum, the Frehsee photo course serves as an off campus extension of the Underwater Careers International/PADI U/W Photo Instructor's Certification Program.

For information please contact Divers Unlimited/UCI at 6023 Hollywood Blvd., Hollywood, FL 33024.

STANIEL CAY DIVERS

Captain Bill Crawford, formerly of Tropic Isle Dive Shop in Key Largo, Florida, and Marcus Mitchell, owner of Eleuthera Marine and Scuba, have combined their talents and experience. They have opened a new dive facility in the Bahamas. Staniel Cay Divers is on Staniel Cay, Exumas, Bahamas, home of the Thunderball Grotto where underwater scenes from the James Bond movie *Thunderball* were filmed, as well as scenes from the new James Bond movie, *Never Say Never Again*.

Staniel Cay Divers offers wall dives and a variety of drift dives just minutes away. Also available is PADI dive instruction, open water check-outs, equipment rentals and underwater camera rentals. Capt. Crawford also offers U/W photography instruction and Nikonos repair.

For information contact Capt. Bill Crawford, Staniel Cay Divers, c/o T & M Associates, 1640 S.E. 7th St., Ft. Lauderdale, FL 33316.

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Scuba Bowl III, a travel school for dive stores, is scheduled to be held on Grand Cayman Island, October 1-8. It will be the third year for this event and attendance is expected to be the highest ever.

Headquarters for the Scuba Bowl III lectures and boat departures will be the Holiday Inn, Grand Cayman on Seven Mile Beach. The daily program consists of morning lectures starting at 9:00 am in the Brac Reef Conference Room. Dive boats will leave from the adjacent beach in the early afternoon.



photo/Gen Murphy

Scuba Bowl III seminar lecturers include Al Hornsby, vice-president of PADI, who will present a brand new series of informative lectures on dive/travel marketing for the retail dive store. Paul Tzimoulis, Editor/Publisher of SKIN DIVER, will present a new series of lectures on underwater photography. Additional lectures will be presented by Cayman Islands travel experts.

The Scuba Bowl III week long seminar is open to dive store owners and managers, as well as dive store instructors and travel tour leaders. Participants may select one of several Scuba Bowl III hotels or dive resorts for their stay. A number of special evening programs will be incorporated into this year's event and there will be a sightseeing tour of the island.

For further information, prices and reservations, dive store owners should contact Miss Linda Taylor, Cayman Airways, 9999 Richmond Ave., Suite 131, Houston, TX 77042; telephone (713) 977-0604.

CLIFTON/ANSE CHASTANET

Anse Chastanet Hotel on St. Lucia, a PADI training facility, has appointed John Clifton as diving instructor.

St. Lucia is a virtually unknown dive destination in the West Indies with almost virgin reefs and a profusion of marine life. The volcanic nature of the island lends itself to a wide variety of diving and since joining Anse Chastanet, John has set up a new program which includes night, wall, reef, cave, drift and deep diving.

For further information contact Underwater Connection 4900 Bissonet, Suite 206, Bellaire, Texas 77401.

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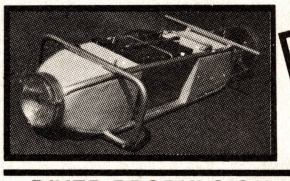
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LIVING OFF THE SEA

(Continued from Page 119)

clawed through a seemingly impenetrable forest of subtropic bushland.

Students may be asked to test their endurance, stamina, imagination and, courage in an *au verite* simulation of a genuine marine survival situation.

Instructors, well-acquainted with the principles of survival in a marine enviornment teach the rudiments of spear and hand line fishing, edible plant identification and preparation, camp cookery, shelter construction, manufacture of solar water distilleries from beached refuse, construction of a simple but accurate compass and other elements likely to be needed in a real emergency.



Living off the Sea is a significant diversion from UNEXSO's normal offerings, Englander conceded. The facility is recognized as a sport diving and training center. As many as 7000 recreational scuba divers may be hosted each year.

A rise in the popularity of backpacking and the apparent marketability of an island-based wilderness experience led to UNEXSO's decision to package the program, Englander said.

The program proved to be popular even when fresh lobster wasn't included on the menu.

One group shared a conch salad concocted from wild plants and a single conch, John Brooks admitted, when no one was able to produce a fish for dinner.

Tempermental weather, personalities and unpredictable circumstantial events dictate no two Living off the Sea courses can be identical.

Shakedown courses were staged from Grand Bahama Island. Future plans include a change of location to Great Abaco Island to take advantage of relatively protected seas and diversity of scenery. In addition to its well known Freeport operation, UNEXSO operates a center at Treasure Cay, Abaco and intends to use that facility as a jump off point and destination for the survival course series.

Living off the Sea is designed to be acceptably difficult but enjoyable. Participants may discover strong bonds of fellowship percipitated by shared hardship.

The cost of the program is $450 exclusive of transportation to and from the site and hotel accommodations before and at the conclusion of the course. For specific dates and additional information write: The Underwater Explorer's Society, P.O. Box F 2433, Freeport, Grand Bahama Island, Bahamas; (809) 373-1244.

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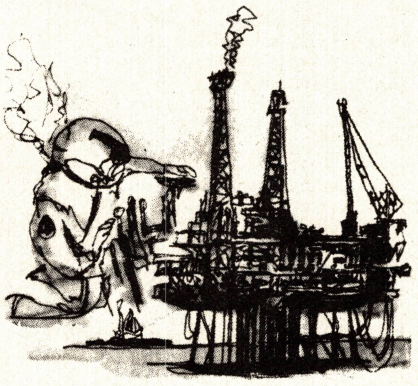
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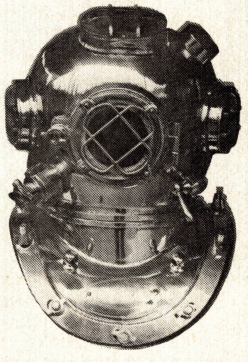
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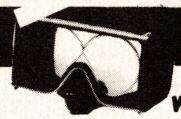


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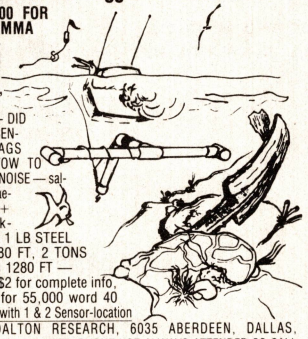
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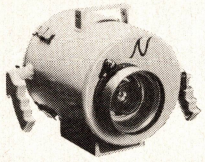
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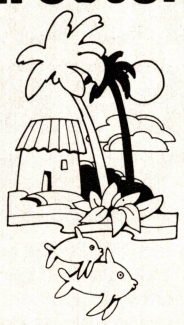
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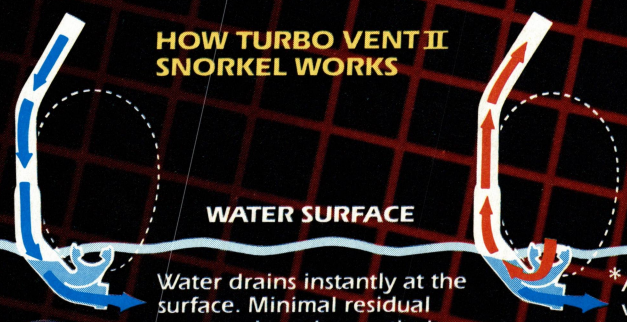
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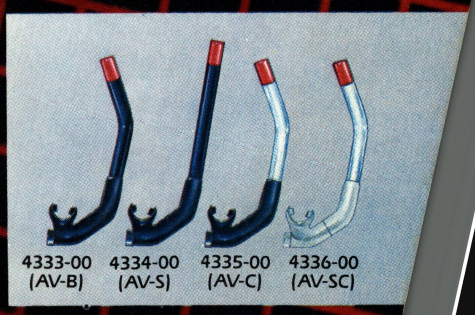
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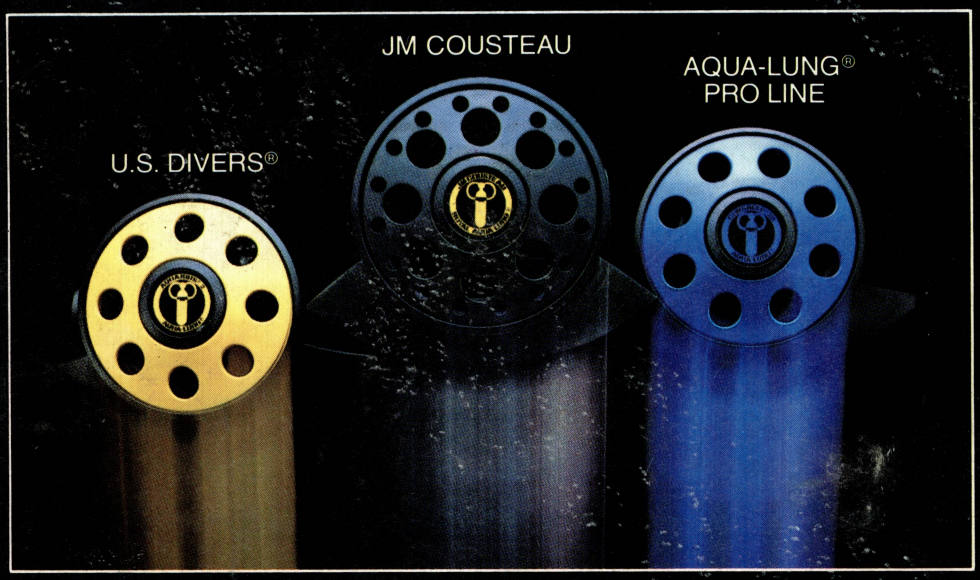
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